for . . .

engineers and contractors controlling the design, specification, installation and maintenance of heating, ventilating and air conditioning.

HEATING AND VENTILATING

The Air Conditioning Monthly

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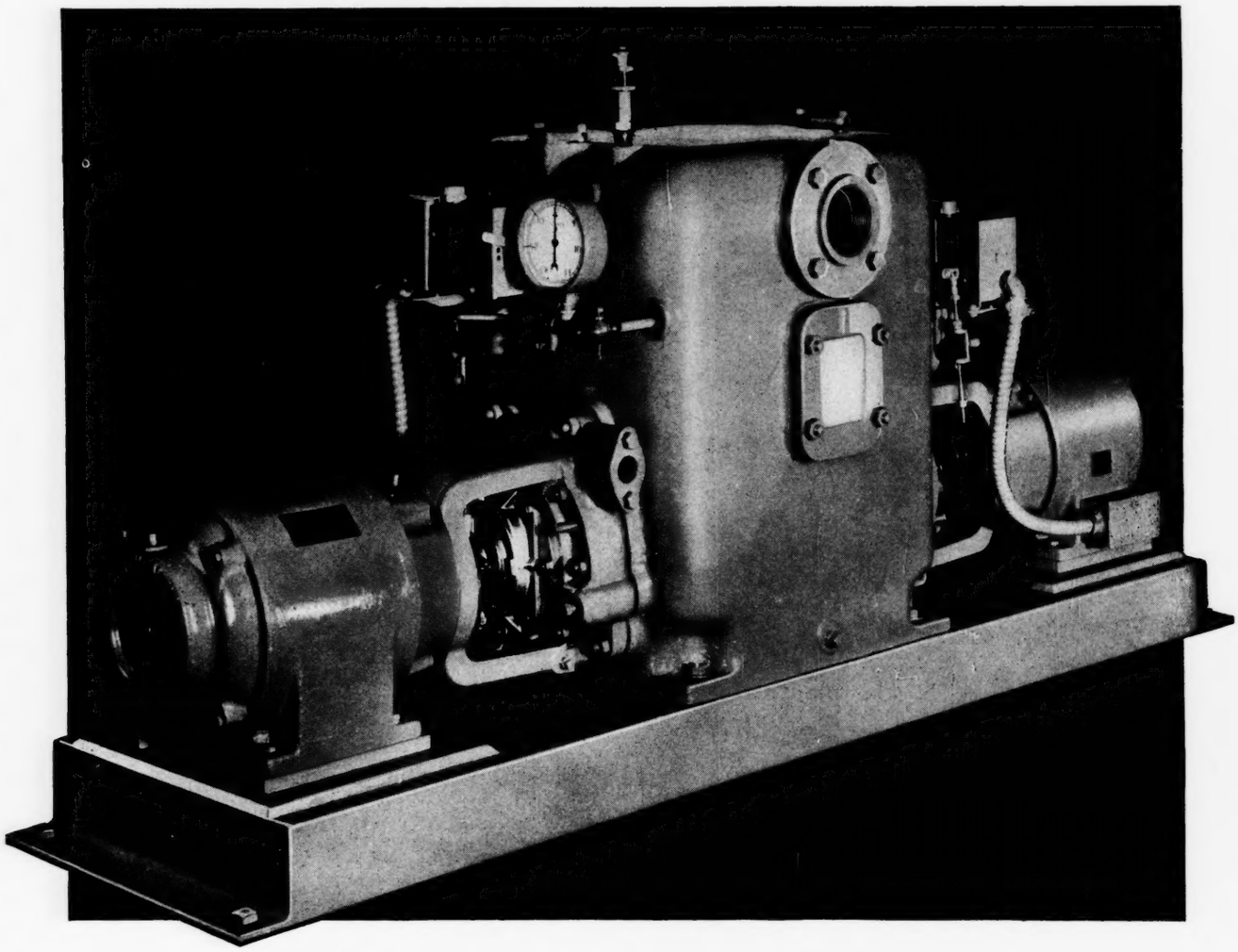

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Air Conditioning

FOR AMERICAN DEFENSE

Of all years in U. S. history this is the time to look ahead rather than back. For that reason, this issue, which would normally have been the 8th Yearbook of Progress, is, instead, largely devoted to American Defense.

This section which immediately follows includes descriptions of the heating, ventilating and air-conditioning involved in seven defense projects, selected because they are representative of projects under construction or

BADGER EXPANSION JOINTS

WHY THEY'RE THE BEST BUY

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Because we have always had such a keen appreciation of the forces involved when an expansion joint absorbs pipe line movements, we have always given every care to the design and manufacture of Badger Expansion Joints.

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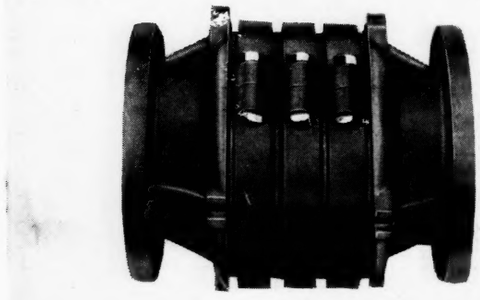
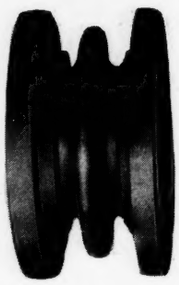
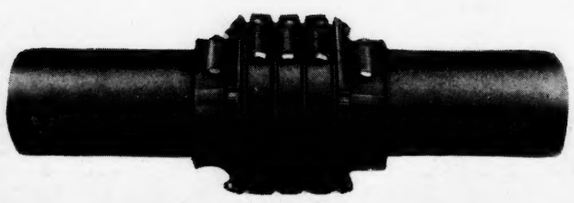
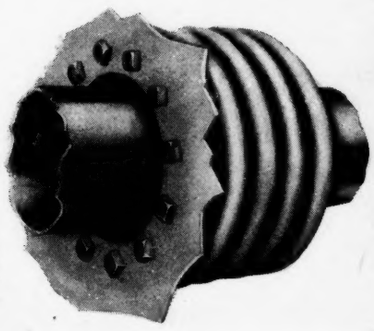




Non-Equalizing Expansion Joint (left) for low pressure, short traverse movements; also for absorbing vibrations between equipment and pipeline. Bulletin 200. Flexible Pipeline Seal (below) for making watertight seals where pipelines pass through walls or foundations while allowing for expansion and contraction.



Directed Flexing, Self-Equalizing Expansion Joints (at left) showing flanged end and welding end types. Bulletin 100 gives full details.



DESIGN FOR DEFENSE

By ALBERT KAHN†

It can be truthfully said that Albert Kahn, Inc., has "not only brought architecture to industry, but brought industry to architecture." On the genius of this internationally famous industrial architect, who designed the first reinforced concrete factory in this country in 1903, has been built an organization which even in normal times employs over 400 technicians, whose clients are companies like General Motors, Chrysler, Curtiss-Wright, Ford, and Republic Steel, and which has designed a billion dollars worth of industrial building. Since at the present time all of the energy and skill of this organization is being devoted to the design of industrial buildings for defense, HEATING & VENTILATING is proud to present some of Mr. Kahn's views on heating and air conditioning of defense plants.

THE second World War, which has brought about a drastic change in the thinking of the American people, and our realization of the necessity of adopting defense measures to accomplish in two years what Great Britain failed to accomplish in four years, has probably had its greatest visible effect on our manufacturing industries. This is reflected in increases in employment from September, 1937, to September, 1940, of 352% in the aircraft industry, 65% in shipbuilding, 76% in engine plants, 61% in plants making explosives and 48% in the machine tool industry. Such increases obviously imply a tremendous increase in industrial plant building; orders on the books of durable goods manufacturers indicate no slackening in the demand for further production capacity, and consequently no let-up in the present high rate of industrial building construction.

Just what are the effects of this heavy demand on the architectural and engineering organizations who are responsible for the design and construction of the new plants now being built or projected? Are the emergency conditions under which we are working sharply different from normal ones insofar as they affect our designs and techniques? More pertinent to readers of HEATING & VENTILATING, is the carrying out of the immediate defense building program changing any of our basic concepts regarding the heating or air conditioning or ventilation of industrial buildings?

Demand for Speed

Fundamentally the principal difference between normal design and construction procedures in our practice

†Albert Kahn Associated Architects and Engineers, Inc., Detroit.

and those existing today is in the time allowed for a given operation. For example, a 440,000 sq. ft. plant addition for the Glenn L. Martin Company was conceived, designed, built, and ready for occupancy in eleven weeks. Such an accomplishment is only possible with smoothly running organizations experienced in design and construction. Internally, however, our organization functions much as it always did excepting that, first, our force of architects and engineers has been greatly expanded, and, second, our staff is working longer hours at a higher speed than ever before. On the other hand, no phase of the design process is slighted, estimates are just as carefully checked as before, and, in the field, the construction is just as sound as ever. In other words, our increased output is due to larger forces and a lot of hard work on everybody's part.

Heating

As to the air conditioning, heating, or ventilating, generally speaking, differences between present and past practice are due only to the normal changes resulting from increased knowledge and experience, new equipment available, and to a small extent, to the variations due to changing relative costs and availability of raw materials, equipment, and even labor.

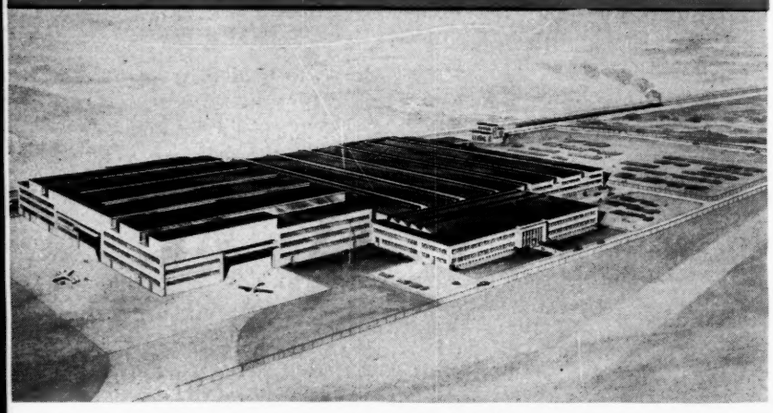
We were recently asked what our conclusions were regarding the fuel situation in view of the possibility of further diversion of oil to aviation gasoline stocks with a consequent limited oil supply available for plant heating purposes. As far as we are able to determine, the relative position of the fuels in availability may easily remain unchanged. There are apparently more than adequate oil and coal supplies, and gas utilities are not so far taxed to capacity. The result is that our decisions on this point depend on factors other than a possible scarcity, primarily on local and specific plant conditions.

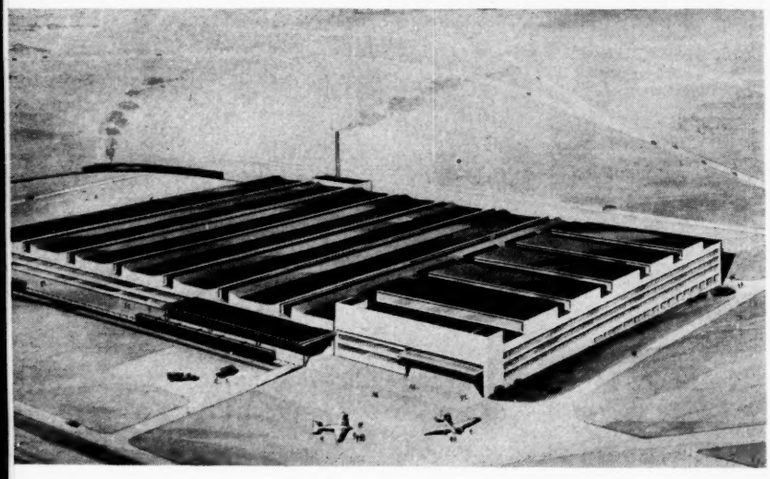
In the distribution of heat, again, the solution of the problem is closely tied in with the individual case. Where process steam is necessary, or where turbine-driven generators are to be supplied, it is logical and economical to heat the buildings with steam. Many of our projects have included office space, for which, in some cases, hot water heat has been selected; in such cases, hot water heat for the factory may be indicated. The unit heater has been developed to a degree where its performance is most satisfactory, either with steam or water as the medium. In natural gas regions the gas-fired unit heater is frequently a wise choice.

A somewhat special case is the light manufacturing or assembly plant, such as that for airplane fabricating, where no process steam is needed. We have specified for several of these, direct oil-fired furnaces with duct systems.

Perhaps at this point the reader of this article will begin to feel that we straddle every question; that we have no strong feeling about any specific fuel; that we are afraid to lean toward or oppose any particular type or method of heating. Actually, the reader is largely correct. We may champion one fuel above others for a given project and on the next job urge against it; we may, and do, sometimes recommend a certain type of heating system as strongly as its salesman but the following week rule the same method out of another specification. The selection and the design of a heating system depends on local conditions and, we feel, are not susceptible of standardization. The fuel and the system must be selected for the job it must do, how well and economically it can do it.

Renderings of two current Kahn projects. The upper view is that of a large airplane plant in the middle west, while that below is another plane factory in the east.





Ventilation

The general ventilation of most factory buildings can frequently be handled by simple methods and with no duct systems. This is not the case where there is any important quantity of dust or dangerous fumes from processes. Where these conditions are foreseen an exhaust ventilation system must be provided.

Here we should point out that we feel that our value to the industrial client is in advising him as to the type

of building that will best suit his requirements. We are not nor do we pretend to be process engineers; we are glad to make suggestions and frequently can explain how a certain machinery layout, for example, was made elsewhere, but we do not attempt to make detailed machinery or process layouts. We feel that the company's own plant engineering staff are in a position better to handle this work. As a result, where there are exhaust ventilation problems in connection with specific machines or processes they are handled by the client's engineers, frequently cooperating with engineers of manufacturers of plating equipment, sand blast machinery, and so on.

One of the applications of ventilation in industrial plants that has not been fully exploited and one to which we give careful thought and include wherever necessary and practicable is that of the locker rooms. Adequate ventilating in these quarters is not only desirable from a standpoint of industrial hygiene but is helpful in personnel relations.

Defense of Plants

Full protection of production facilities from air attacks has in the past been a matter of some concern abroad and, more recently, to us. Among others, the principal objectives in full protection against aerial or land bombardment are (1) effectively to conceal the building from the air or from a distance in daytime, (2) to blackout the building from aerial view at night, and (3) to design the building so as to afford maximum protection against the explosion of bombs and shells.

It is the second of these three points that is of most concern to those engaged in air conditioning engineering, for the much-discussed windowless plant is one method of meeting the objective.

The windowless building is, however, only one method. Its only advantage in concealment from the air at night is that there are no lighted windows. If the windows in a more conventional plant are covered by opaque screens or curtains there will be no lighted windows.

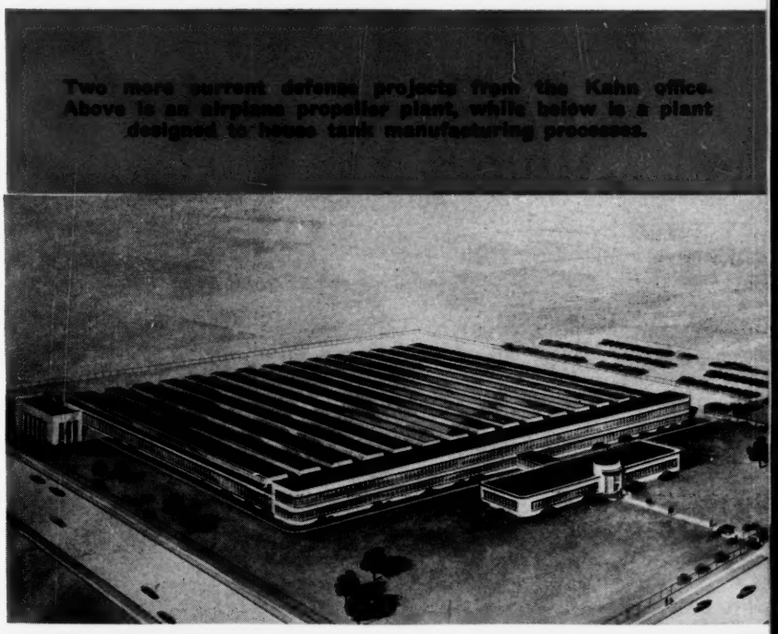
If windows are completely sealed, or if there are no windows, means for carrying away excess heat are necessary. A cooling system, or at least a ventilating system, may be indispensable if the plant is to operate on warm summer nights.

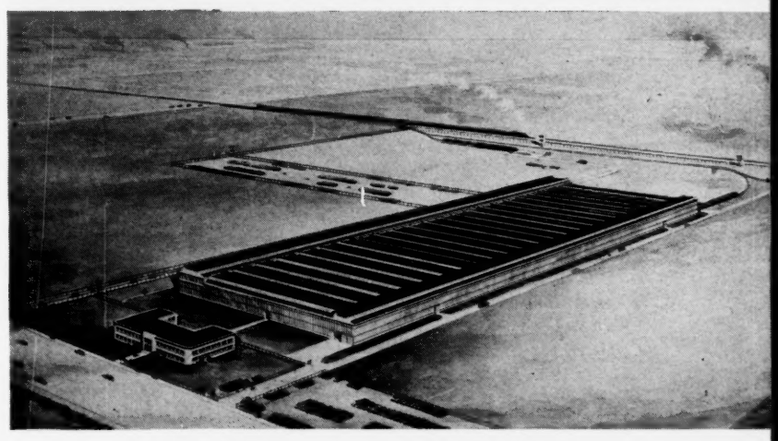
Whether a windowless building, with complete air conditioning is justified or not depends on many factors. If the product is one that under normal operation can be more efficiently produced under controlled atmospheric conditions, then the conditioned plant may be desirable aside from air defense questions. This still does not necessarily indicate a windowless plant, for air conditions not only can be but are being controlled in more plants with windows than without, and from the standpoint of defense the windows can still be effectively screened without sealing them up.

Among some other points to be considered in determining whether a windowless factory is desirable are: Are controlled conditions necessary in a few departments or in the entire plant? Will a windowless building be more or less efficient under routine and normal operation than a more conventional plant? Can the same results be obtained in the specific case far less expensively than with a windowless plant?

In other words the windowless building has advantages and corresponding disadvantages. It may be the proper solution in one case and an expensive white elephant in another. We feel keenly our responsibility to our client not to recommend or urge an investment beyond the results it will produce, and for that reason, aside from others, we have not accepted the windowless building as a complete solution of all problems in all cases.

So while we can not assure the air conditioning industry a great market for air conditioning in all of our buildings we do believe that the opportunities for air conditioning in industry are steadily growing. More than that the growth is healthy because, in our case, where we recommend air conditioning it is because it is justified and proves itself to be a sound investment.





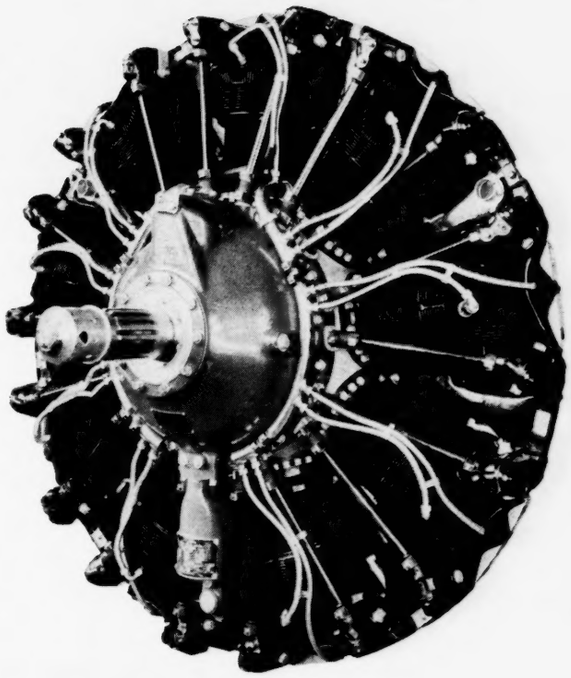
Two more current defense projects from the Kahn office. Above is an airplane propeller plant, while below is a plant designed to house tank manufacturing processes.

WRIGHT AERONAUTICAL

WRIGHT Cyclone and Whirlwind engines have been widely used by both the U. S. Army and Navy to power advanced types of military aircraft. For example, Wright Cyclones powered all of the Boeing B-17 four engined army bombers, Douglas B-18 and Martin B-10-B twin-engined army bombers as well as at least 20 other military aircraft. In addition, Wright-powered planes are used on nearly all of the major commercial airlines throughout the world. They power, among others, the Stratoliners of Transcontinental & Western Air Inc., and the Stratoclippers of Pan-American Airways. The Cyclone, a radial air cooled type engine, is in such great demand for military service that Wright Aeronautical Corporation in November, 1939, began work on a 480 x 980 ft. addition to its Paterson plant so as to increase the company's floor space by approximately 12½ acres. With the new plant, erected in 57 days, Wright Aero is capable of producing approximately 1000 engines per month when top production has been reached. Single story in height, with the exception of two wings at each end, of reinforced concrete and brick construction, Plant No. 2 has been laid out for line production of aircraft engine parts. Raw materials entering one end of the building flow through manufacturing operations in a continuous line without backtracking and emerge as completely fabricated units. Machines are installed in twelve double lines separated by wide aisles. The lines are broken by three main cross aisles along which materials move and which serve as terminal points for collection and delivery of parts. This layout is similar to that employed in the mass production of parts for automobiles.

CORPORATION

in 57 days builds plant to produce 1000 airplane engines per month. New boiler plant provides 35 lb. steam for unit heaters; ventilation a feature. Plant designed by Albert Kahn Associated Architects and Engineers, Inc.



ENGINES
FOR DEFENSE

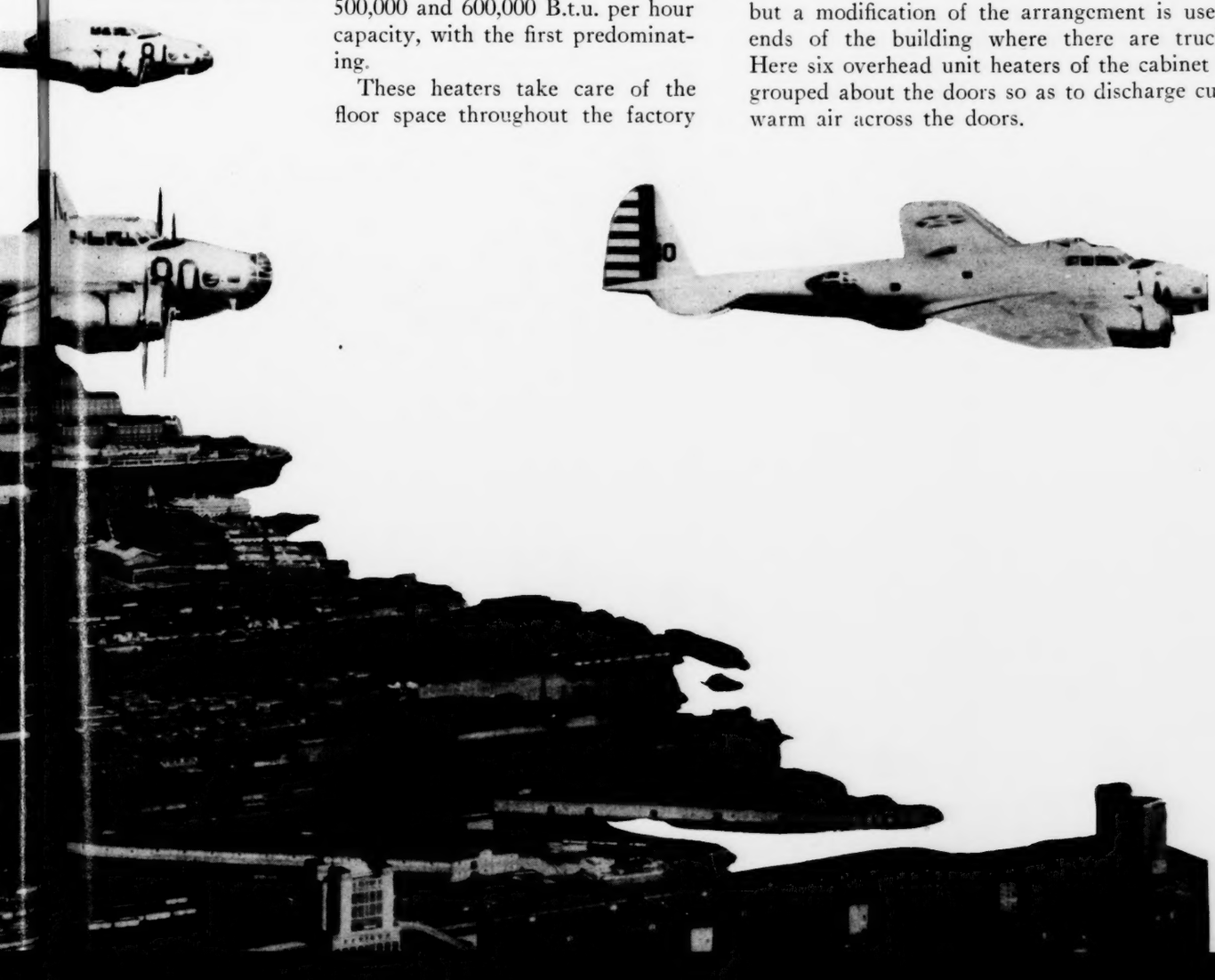
Upon completion of the last machining operation, parts are delivered directly to the final inspection crib. Parts to be plated or painted go from the machining line direct to the finishing group before moving to the final inspector. After final inspection, parts are trucked to finished stores and assembly departments in the main plant for assembly into complete Cyclones and Whirlwinds.

Heating

Steam is generated in two water tube boilers of 460 boiler hp. each, at 110 lb. per sq. in. and reduced at several stations to 35 lb. for the unit heaters in the factory, and to 5 lb. for wall radiators in the factory offices. Boilers are oil fired with Bunker C fuel, which reaches the automatically controlled burners at 250 lb. pressure and 250F temperature.

The factory itself is heated by 18 rows of overhead unit heaters alternating between 5 and 6 heaters per row. The units are suspended by 3 x 3 in. angle iron in the roof monitors and each unit has four-way diffusers. There are three sizes of unit heaters, 350,000, 500,000 and 600,000 B.t.u. per hour capacity, with the first predominating.

These heaters take care of the floor space throughout the factory but a modification of the arrangement is used at the ends of the building where there are truck doors. Here six overhead unit heaters of the cabinet type are grouped about the doors so as to discharge curtains of warm air across the doors.



All flow and return pipes to the unit heaters are placed in the roof trusses at least 20 ft. above the floor so as to conserve floor space. Almost 20 miles of piping were used in connection with the heating and plumbing.

All lines from more than 2½ in. were welded and to effect this 10 portable welding sets were required.

Plating

Plating processes are widely used for a variety of reasons in the manufacture of modern aircraft engines. For example, cadmium plating is applied to reduce oil resistance and wear, and to improve the appearance of such small parts as connecting rods.

Tin plating is applied to cylinders for a most unusual reason. Nitriding, a process employed to harden metal surfaces and by means of which nitrogen penetrates the surface, is used on the interior of cylinders to reduce wear. To accomplish this the cylinders are placed in a chamber where the gaseous nitrogen entirely surrounds the cylinder. Unless other provisions are made this results in the nitriding of both the outside and inside of the cylinders. Since this is not desirable, prior to nitriding, the entire cylinder is tin plated as the nitrogen will not penetrate the tin. Consequently, the interior of the cylinder is tin plated and this is removed from the bore of the cylinder before nitriding.

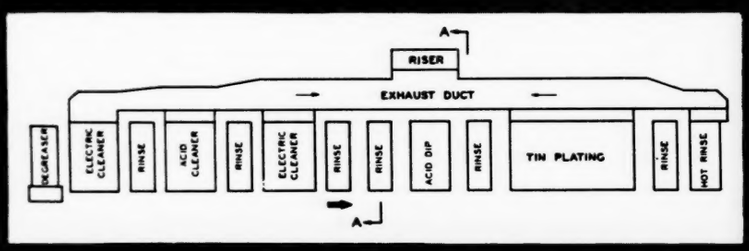
Tin plating is a fairly complicated process and the tin plating apparatus is arranged so that the thirty cylinders per hour being plated automatically pass through the following baths: (1) vapor degreaser, (2) electric cleaner, (3) warm rinse and spray, (4) acid cleaning process, (5) cold water rinse and spray, (6) electric cleaner, (7) warm rinse, (8) cold water rinse and spray, (9) acid tank, (10) cold water rinse and spray, (11) tin plating, (12) cold water rinse and spray, (13) hot rinse. The last bath is followed by a blast of air for drying the part.

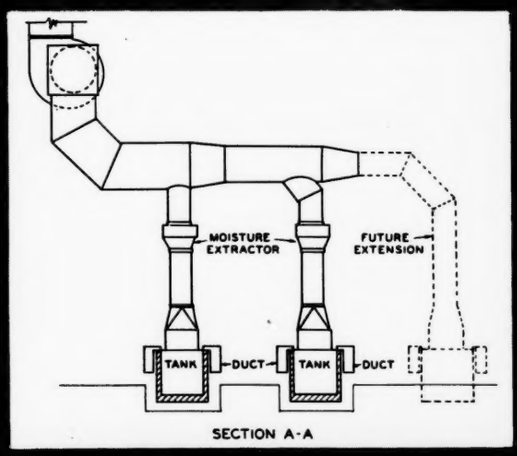
In order to protect the workingmen and equipment from the detrimental effects of escaping fumes, an exhaust system is connected to tanks 2, 4, 6, 11 and 13. For this purpose a 1300 c.f.m. blower is connected to a suitable exhaust ventilating system as illustrated. The duct from the acid cleaner tank is lined with lead and coated with an acid resisting paint.

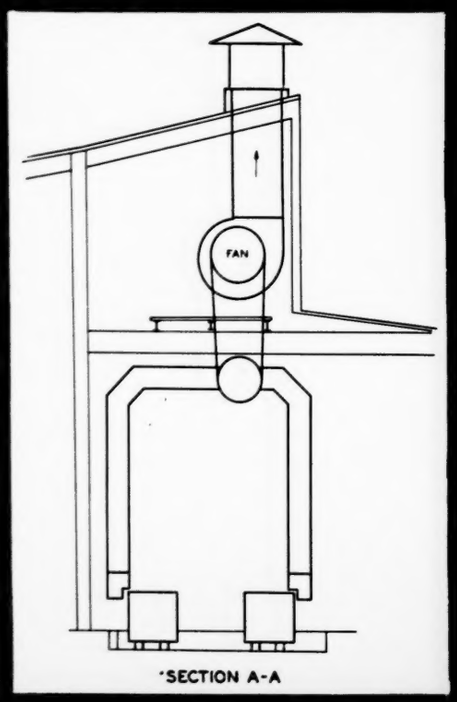
Chromium plate is used in several different ways. Chromium plating has a high finish, is decorative, and has an extremely low coefficient of friction, while chromium plating with copper and nickel plating is anti-corrosive. Consequently, many parts are so plated.

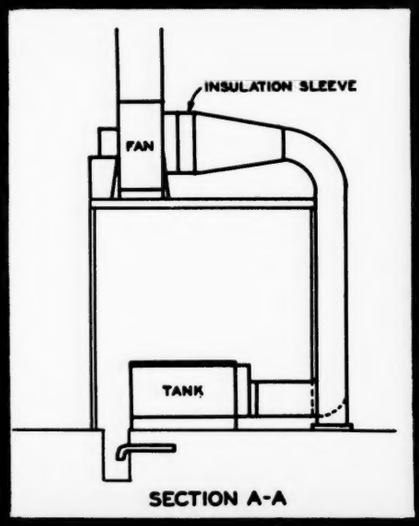
Where chromium plating is used, however, the fumes are not only unpleasant but are highly corrosive and it is not considered desirable to allow these fumes to escape into the outside air. To prevent this escape of acid, a moisture extractor is used in the exhaust system

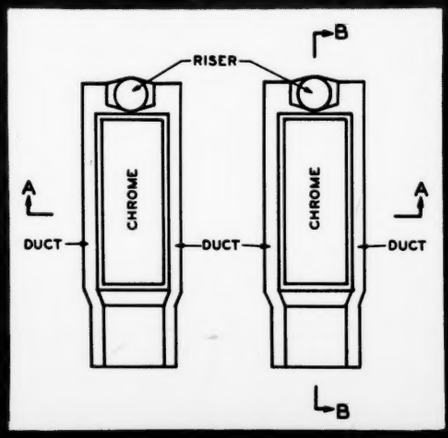
1. Plan view of tin plating process tanks showing exhaust ventilating connections.
2. Section AA of the chromium plating arrangement (Fig. 5) showing the moisture extractor.
3. Section AA of cadmium plating exhaust system (Fig. 10) showing roof outlet.
4. Section AA of the tin plating system exhaust (Fig. 1).
5. Plan of the exhaust duct arrangement for the chromium plating squipment.

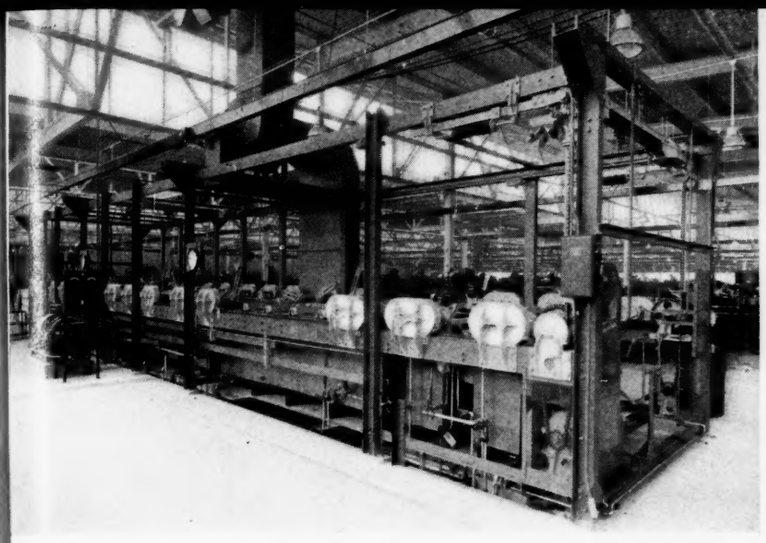












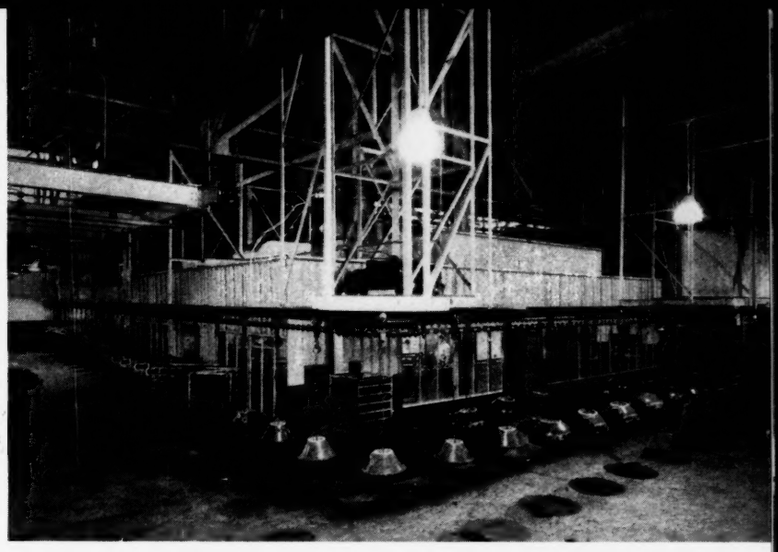


Fig. 6. Tin plating equipment, fumes from which are exhausted through the ducts shown in the background by the American Blower fan mounted on the platform, then discharged to the roof. One of the Wing unit heaters, used throughout, at upper left.

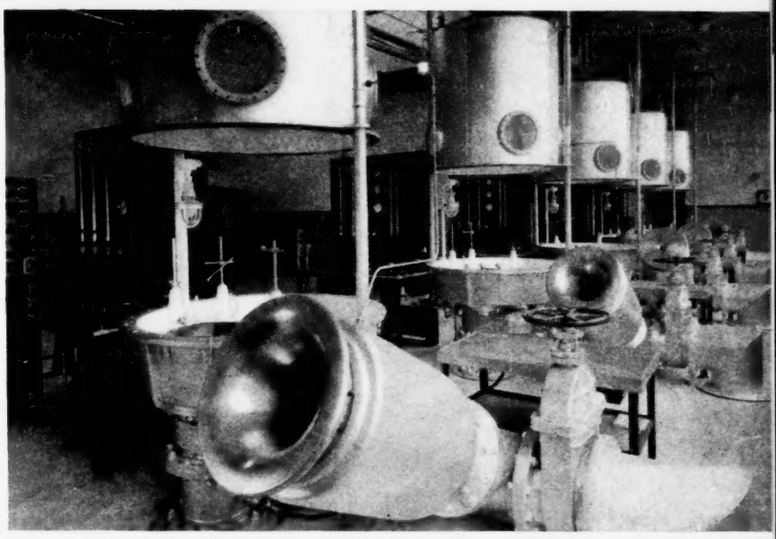


Fig. 7 (Upper right). Continuous conveyor type spray painting setup which is enclosed as shown. Air supply to these booths is heated by passing over Webster-Nesbitt surface, cleaned by Owens-Corning filters and is then forced past the painting operation to the exhaust duct slot at the rear, water-backed curtain wall.

Fig. 8 (Right). Wright carburetor testing laboratory. The heavy casings are dropped down around the carburetor when it is being tested.

provided for the chromium plating tanks. These extractors enable both the reclamation of the chromic acid and the prevention of acid escape.

The sketch shows an exhaust system serving two chromium plating tanks, with provisions for a third tank and exhaust connection at some future date. The blower is driven by a 7½ hp. motor and is capable of removing 6000 c.f.m. Air is removed from the surface of the tanks by means of slots running along the edge of the tank.

Cadmium plating is used extensively in order to reduce corrosion and oil resistance, to increase wearing qualities, and to facilitate magnaflux inspection. In cadmium plating, the parts to be handled must go through successive baths as follows: (1) electric cleaner, (2) warm water, (3) cold water, (4) acid cleaning, (5) cold water, (6) cold water, (7) cadmium plating, (8) cadmium plating, (9) cold water, (10) hot water, (11) hot oil, (12) degreaser.

The accompanying sketch shows the exhaust ventilation system provided to remove the fumes from tanks 1, 4, 7, 8 and 11. Although cadmium is not particularly poisonous, nevertheless, in order to be on the safe side, it was felt desirable to remove these fumes from the plant. Here a 7½ hp. fan was used on the exhaust system.

After plating many parts are dried in an electric furnace. Heated air is passed over the moist parts and the saturated air is removed by an exhaust system and discharged into the atmosphere.

Painting

Most parts which require painting in the Wright plant are spray painted. In one or two instances, notably in the case of the cylinders, the parts are dipped and then whirled by machinery to throw off excess paint. Spray painting on most parts is performed while the parts are on a continuous conveyor.

Some of the accompanying illustrations show the principal spray painting set-up which consists of a completely enclosed room subdivided into booths. Air is first heated by passing over extended surface supplied with steam, after which it passes through renewable filters so as to remove all dust. This air is then pulled over the work being painted, drawn down through a slot at the back of the booth, and thence into the exhaust system. Water backed curtain walls with a continuous flow of water catch excess paint and precipitate it into a sludge tank below. Many of the parts receive as many as four coats of paint.

Dust Removal

There are numerous exhaust systems through the plant for removing dust at the origin and where it exists at concentrations which are undesirable from the standpoint of efficiency and health of the workmen. Among the applications of dust removal are those where grinding of parts takes place as shown in the accompanying photograph illustrating five grinding booths. Here air is drawn past the worker, over the table, and into a dust collector where the metal is removed from the air and the air is exhausted to the roof. Another application is in the case of metalizing, where hot metal is applied to build up parts. Here, again, the air is

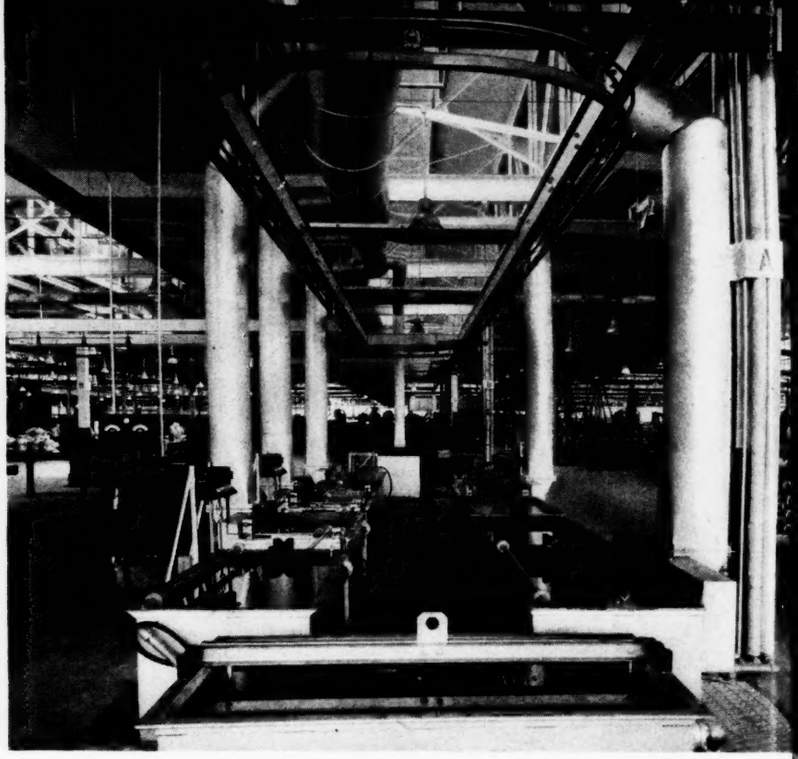


Fig. 9. Cadmium plating equipment and its exhaust system. Note the long narrow slot through which the fumes are drawn off from the tank in the right foreground.

drawn past the worker and into a dust collector which removes the solids from the air after which the air is exhausted to the atmosphere. Still another example is in the case of the bench grinders, also illustrated, where a hood close to the small grinding wheel is connected to an exhaust system, thus drawing the metal dust away from the worker.

Air Conditioning

Testing of the finished engines is carried on in the old portion of the plant. Before they are ready for application to a plane and following their complete assembly, the engines are mounted in a wind tunnel where they are run for six hours, after which they are completely dismantled, all parts examined and again tested for seven hours, then again dismantled and parts examined, after which, if they pass inspection and the performance of the engine has been approved, the engine is again assembled and is ready for shipment.

Since Wright engines must perform perfectly under a wide range of conditions involving severe changes of temperature, humidity and air pressure, the engines are tested under a wide range of conditions. Air conditioning is employed to vary the conditions of the air supplied to the carburetor of the engine on the text block. There are 25 test cells, each with an instrument room; adjacent to this room is located a unit air conditioner with steam and cold water connections. By varying the quantity of cold water or steam to the conditioner the temperature and relative humidity of the carburetor air can be varied over a wide range. The conditioned air is fed to the carburetor through a removable and adjustable duct.

Carburetor Testing

The carburetor for airplane engines has developed into a highly complex mechanism. With the development of this device, however, the problem of the most accurate metering has been raised. Present day carburetors are capable of being set beforehand for almost all normal operations, including changes of altitude. Within the past year, Wright Aeronautical Corporation

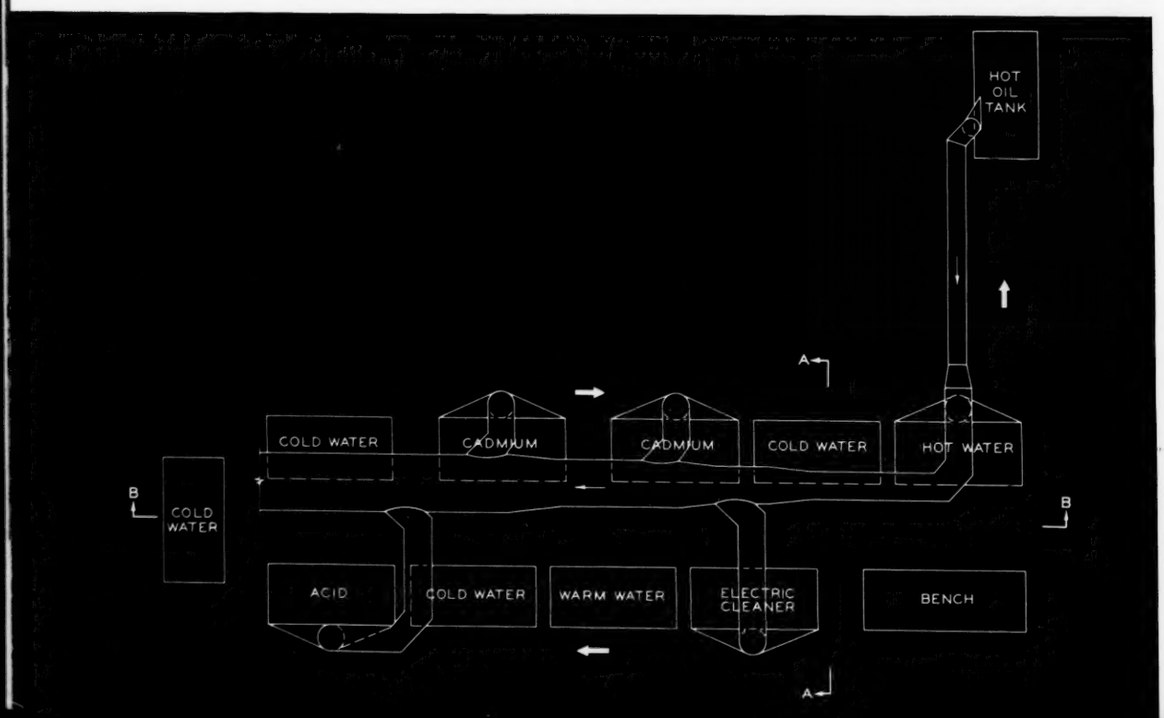


Fig. 10. Plan of exhaust duct layout for cadmium plating department.

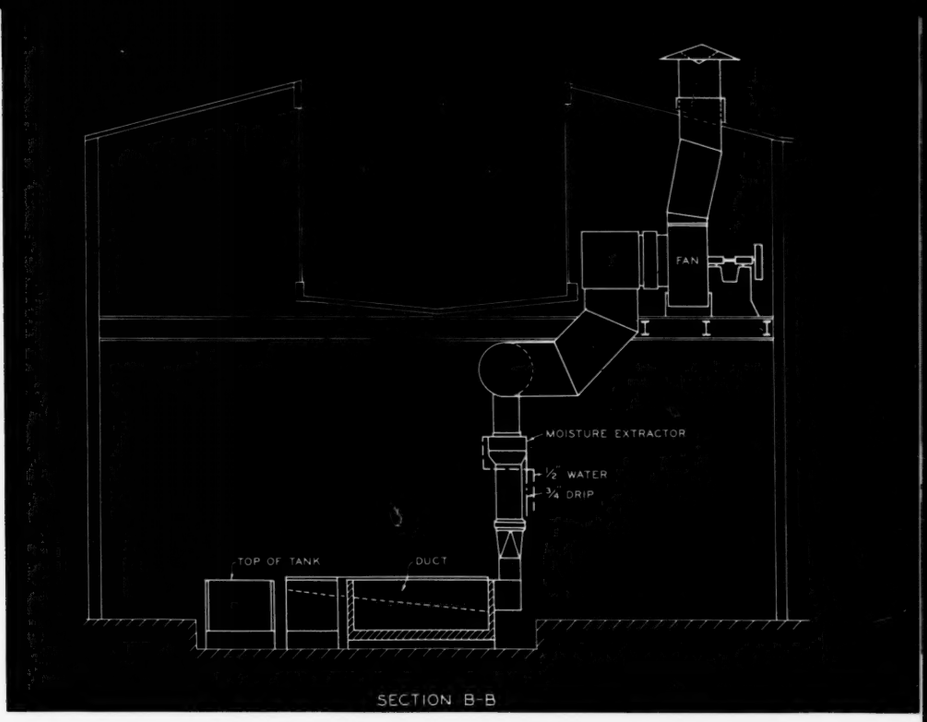


Fig. 11. Section BB of the chromium plating arrangement (Fig. 5) showing the roof outlet.

has constructed a carburetor testing laboratory to provide a better method for metering these devices. This laboratory, designed by Wright engineers, houses five *air boxes* in which the carburetors are tested. The air box, made extremely strong due to the explosive mixture fed to the carburetor, has heavy glass portholes through which the engineer can observe the carburetor whose performance is compared with the reference carburetor. The interior of the air box is illuminated and air is drawn through the carburetor by means of a large vacuum pump with a capacity of 1500 lb. of air an hour. In addition to testing carburetors at sea level conditions, it is possible by the use of throttling valves to simulate atmospheric conditions.

Outside air used for ventilation and for supplying the carburetors is taken through three louvered openings in the basement, equipped with filters and preheating steam coils which operate automatically when outside temperatures fall below 35F. Two conditioning units, also located in the basement, draw air through the three inlets and heat or cool the air as required to maintain a temperature of 76F. The full capacity of the two conditioning units is approximately 16,000 c.f.m. The total amount of air exhausted from the room when no air boxes are in operation is just enough to remove quickly any gasoline vapors present due to draining carburetors or disconnecting them from the gasoline in the air box.

The piping is arranged so that one or more pumps can draw air from its own air box or any other air box, and control is maintained by means of large gate valves in the common line and pumps leading to a header. They are accessible through hinged covers in the floor and may be manipulated with a wrench, enabling the operator to open and close them from the first floor.

In this laboratory, which is the first laboratory of its kind to be erected in the United States outside of the plant of a carburetor manufacturer, carburetors are calibrated and the settings checked under all conditions of pressure which may be encountered in actual flight, a further indication of the thoroughgoing test procedure followed by the Wright company.

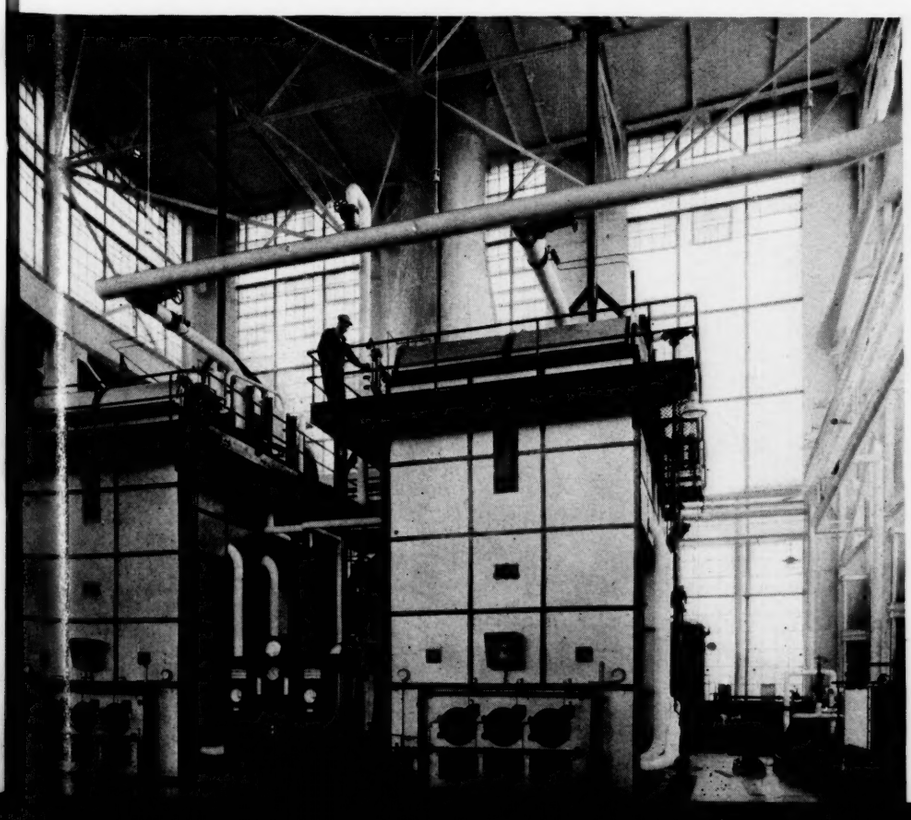
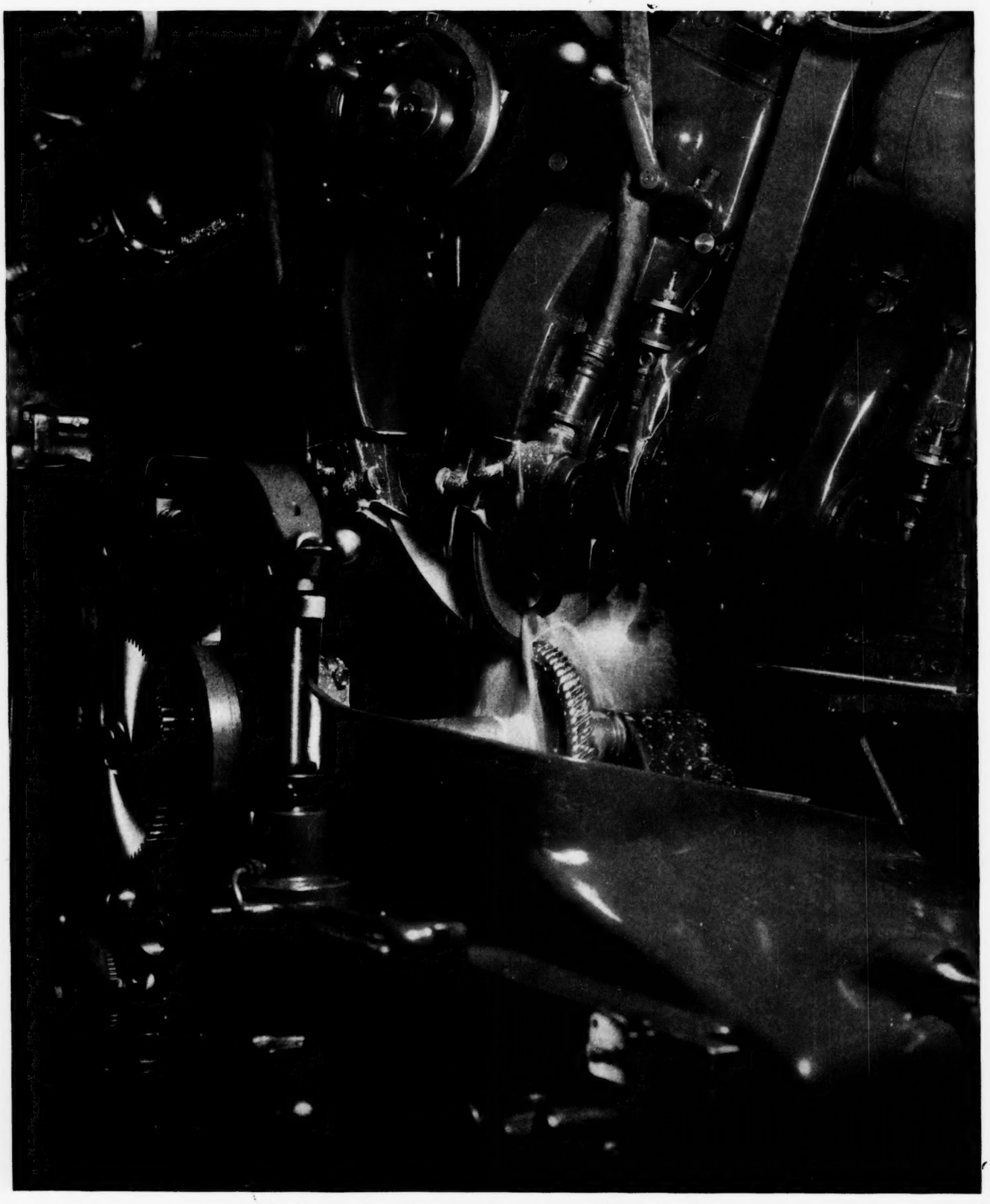


Fig. 12. The two Union Iron Works boilers, fired by Todd oil burners, in the central heating plant, in which steam is generated at 110 lb. pressure.

MACHINE TOOLS FOR DEFENSE

PRATT &



A close-up of a Pratt & Whitney gear grinder in action.

& WHITNEY, DIVISION

Niles-Bement-Pond Company, erects a one-story manufacturing plant with almost 700,000 sq. ft. area and an attached two-story office building. Both steam and hot water are used for heating.

IT is a rare occurrence when an industrial concern completely abandons a plant which has been built up over a period of years for an entirely new plant designed specifically for its own need. When the concern is one which has been in one location for 79 years and occupies 23 multi-story buildings it is an event which probably occurs only once in a decade.

However, the Pratt & Whitney Division of the Niles-Bement-Pond Company has done just that. It has abandoned its 79 year old plant of 23 separate buildings for a modern plant of two buildings, one nearly 1000 ft. wide and 550 ft. deep, and what is even more remarkable it has built and occupied the new plant in less than ten months. The moving operation in itself was a gigantic task—involving the transfer of 23,000 tons of machines, equipment and furniture.

The new plant comprises a main manufacturing building with an attached administration building and another building group composed of a pattern shop, garage, and boiler house. This latter group is located to the east of the manufacturing building in such a manner that it can be expanded without encroaching on any of the space that may be required for future building programs of the manufacturing building.

It might be mentioned here that Pratt & Whitney, Division Niles-Bement-Pond Company, is one of the oldest and best known manufacturers of machine tools, precision small tools, gages, and shop equipment. It is especially well known for the large amount of research work that it has done and for the number of new products which it has developed. One of the more outstanding developments of recent years is the famous Pratt & Whitney Hoke Precision Gage Blocks, accurate to a few millionths of an inch.

As is to be expected in an up-to-date plant of this size, there is much of interest to the heating and ventilating engineer. For example, there is the heating system of the manufacturing building which is 960 ft. wide by 520 ft. deep. There is an air conditioned gage room which must have its temperature and humidity controlled accurately throughout the entire year to make possible the production of gage blocks accurate to millionths of an inch; and there are numbers of simple though very effective exhaust systems used in such applications as paint spraying, snag grinding, plating, and heat treating.

Manufacturing Building

As mentioned previously this is a one-story building 960 ft. wide by 520 ft. deep with 182 ft. by 40 ft. wings on the east and west sides. The wings house shower and locker rooms for the employees. A covered loading deck 420 ft. long is located at the south of the building and is served by a railway siding connected to the New York, New Haven and Hartford Railroad.

All exterior walls have glazed steel sash, brick curtain wall with gunite spandrels, and walls between the sash and the copper roof cornice. Roof construction is steel deck, tack welded to steel purlins, insulated with one-inch of cork and waterproofed with tar and gravel.

Heating of this building is accomplished by steam under a pressure of 30 lb. per sq. in. The steam mains are carried from the boiler house on an overhead trestle and run through the main manufacturing plant on the lower chord of the roof trusses. Both projection type and ceiling mounted blast unit heaters are used for heating in this building. In general, the projection heaters serve both the section with a clear space of 14 ft. beneath the trusses and the center crane bays which have a clearance of 36 ft. for the 20-ton crane and 26 ft. for the 15-ton crane. The blast type heaters, on the other hand, are located at the edge of the center crane bays and blow air downward into these sections.

Each unit heater is under the separate control of its own thermostat which is located in a position representative of the section served by the unit heater. Connected in the control circuit is a three-way switch which makes it possible to shut off the heater fan, to put it under the control of the thermostat or to operate it independently of the thermostat. This latter position makes it possible to operate the fan during the summer.

Gage Department

Located in one corner of the manufacturing building is the gage department where the gages accurate to

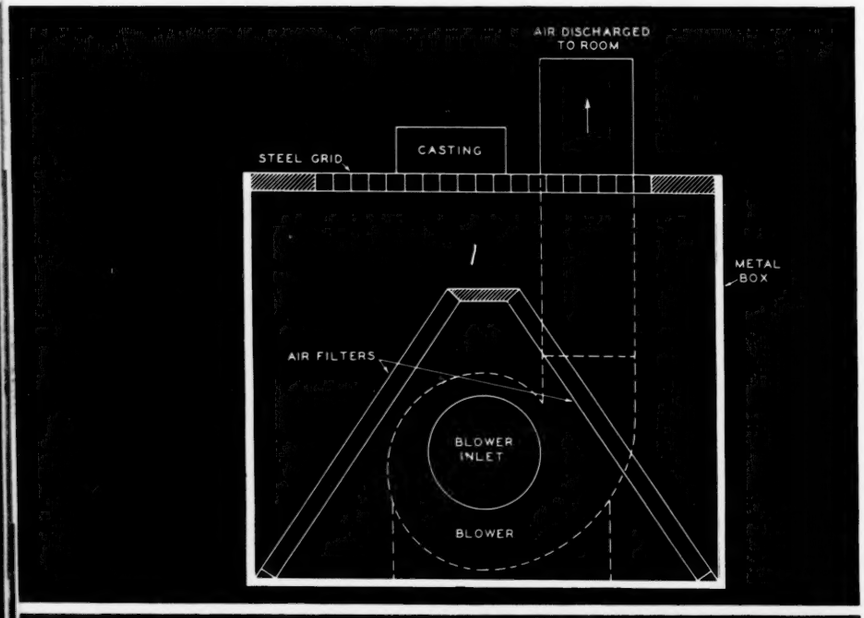
Administration building which houses executive and general offices as well as the production and engineering departments. The heating system is of a forced hot water type and uses Worthington circulating pumps, Trane radiators and convectors, and Minneapolis-Honeywell controls.

millionths of an inch are lapped and inspected. Because slight temperature changes would cause the metal to change its dimensions and because the perspiration of the workers' hands would tend to corrode the fine finishes of the gages, both the temperature and humidity are controlled accurately throughout the entire year. The conditions are maintained at 68F and 50% R.H.

This department is housed in a room 240 ft. by 60 ft. with a 14 ft. ceiling and is conditioned during the summer by a system employing a 42-ton ammonia compressor. The compressor and refrigerant condenser are located in a small room in a corner of the gage department and supply liquid ammonia to the conditioning unit located above the gage room. A steam heated tempering coil is used to raise the temperature of the air to the proper point before it enters the room.

Exhaust Systems

Especially noteworthy are the numerous exhaust systems employed throughout the plant. Although these systems serve a wide variety of equipment they have one thing in common, that is, in each case a stream of air is directed either downward or horizontally across the section to be exhausted so that the contaminated air flows away from the operator.



In the plating room the plating tanks are supplied with exhaust outlets located directly at the side of the plating tanks so as to catch the heavier-than-air fumes before they can get into the room. The outlets are in the form of a slot about two inches in width and extend the length of two sides of the tank. So successful are these that there is no noticeable difference in the air of the plating room and that in the main shop.

Air from each tank is carried to a small cyclone located next to the tank which removes any drops of the plating solution before the air flows to the main exhaust ducts which carry it to the roof.

Of considerable interest is the system used for preventing dust and dirt from the snag grinding operations from getting into the room air. Snag grinding is a term for the process in which the rough castings from the foundry are cleaned and roughly shaped. Since a considerable quantity of sand and metal is released during this process some means of removing this dirt must be used. In this plant the castings which are to be cleaned are placed on a metal grid which is mounted in the top of a metal box. Air is then withdrawn from the side or bottom of the box by a blower which blows the air back into the room. To clean the air and to prevent the dirt from getting back into the room, glass wool filters are mounted in the box so that all of the air entering through the grid must pass through the filters before it can reach the fan.

In operation air is drawn at about 2000 ft. per min. through the open grid during the time a casting is worked on. All the loose material removed from the metal is drawn by this blast of air into the box and onto the filters. About once a week these filters are removed and shaken over a waste can. They are then placed on the grid of a box which still has its filters in place and thus further cleaned.

Exhaust systems are also provided for the paint spray booths, for removing the oil fumes from the hot oil baths in the heat treating operations and for removing the metal and abrasive particles from the dry grinding operations. In all cases where cyclone collectors are used the collectors are located inside the plant, usually in the monitors, both to prevent moisture condensation during the winter and to improve the exterior appearance of the building.

Pattern Shop, Garage and Boiler House

Separated a short distance from the manufacturing building, yet centrally located, is a fireproof steel and brick unit made up of a one-story garage 220 ft. by 60 ft., a two-story pattern shop 122 ft. by 242 ft., and a boiler house 37 ft. by 82 ft. and 40 ft. high. A brick stack 178 ft. high is located nearby.

The boiler house, which is designed to supply the necessary steam for heating and process work, has three high pressure boilers designed to operate at 200 lb. per sq. in. Each boiler has a capacity of 35,000 lb. of steam

(Above) Schematic diagram of the table used for grinding operations. An exhaust system draws the dust and dirt through the steel grille to the filters. After passing through the filters the air enters a blower and is discharged into the room. (Below) Photo showing the steel grid in the top of the grinding table. Grinding exhaust system and paint spray exhaust systems are made by Binks.

per hr. and is fired by wide range of oil burners which consume Bunker C oil.

Fuel oil storage tanks are located north of the boiler house in a slightly elevated position. They can be filled either from tank cars on the railroad siding or from trucks on the road. An even temperature is maintained in the oil tanks by steam heating coils which receive steam from the boiler house.

The boiler house equipment also includes three air compressors for supplying compressed air and three motor generator sets for supplying direct current to magnetic chucks and cranes.

The garage section was built to house the executive and company cars and trucks and is spanned with a 60 ft. steel roof truss, giving a clear working space of 10 ft. from the floor level to the underside of the truss. Ten foot wide doors are placed at either end of the garage. Both the garage and the pattern shop have cement finished concrete floors and exterior walls of brick with continuous glazed steel factory type ventilated sash. Roofing consists of an insulated metal decking with a tar and gravel waterproof finish.

The pattern shop is separated from the garage by a cinder block firewall. The construction of the first floor is similar to the garage with the exception that steel columns are provided for supporting the second floor construction. Enclosed offices are located in the southwest corner of the building.

Both the pattern shop and the garage sections are heated with 5 lb. steam. In the garage unit heaters of the projection type are employed while in the pattern shop wall pipe coils are used. The office and employment sections are heated with direct, cast iron radiators.

The administration building consists of two sections —a front portion housing executive and general offices and a rear portion housing the production and engineering departments. The front portion is of brick and reinforced concrete construction, 245 ft. by 57 ft. and has two stories and a basement. The rear portion is a brick and structural steel building 245 ft. by 98 ft., one-story and a basement, and connects the offices with the manufacturing building.

The exterior of the building is of modern functional design with all sides—except that facing the plant—constructed of buff face brick with wide bands of projected steel windows encircling the building. Located in the basement is a large acoustically treated cafeteria and kitchen, adequate to serve 2200 employees, in which are incorporated the latest innovations in seating, furnishings and decorations.

Also incorporated in this building is a complete photographic department, including dark rooms; a stock room; locker rooms; first aid rooms; women's rest and recreational rooms and a general recreational room for men. Suspended ceilings have been installed in all corridors to allow for an air conditioning system, if later desired. At the present time this space is used only for the exhaust system for the kitchen, toilet and rest rooms.

Because many of the radiators in the administration building are located below the return mains and because it was felt that a better control could be secured, it was decided to heat both this and the engineering building with a two-pipe, forced hot water system. A machine and heater room in the basement contains two heat exchangers for heating the water and circulating pumps for forcing it through the system. Concealed copper convectors are used in all of the office spaces while wall radiators are installed at the lower end of the bent structural roof trusses in the engineering and production departments.

An inside-outside control system which varies the temperature of the heating water in accordance with the outside weather conditions is used to regulate the building temperature. Room thermostats are also installed to provide individual room temperature control.

(Left) Plating room showing plating tanks. Fumes are withdrawn from the tanks through slots extending the length of two sides of the tank and are carried to a small cyclone where any drops of plating solution are removed before the air is discharged into the ducts which carry it to the roof level. (Right) A section of the manufacturing plant showing the Trane blast type unit heater at side, and Trane projection unit heater above. Each unit heater is under the control of its own Mercoid thermostat. Air conditioning gage room cooled by Frick compressors is located in one corner of the plant.

MOBILIZ

By JOSEPH F. KERN, JR.†

TO provide housing, military, health, and recreational facilities for the greatly enlarged army called for under the National Defense program, the Quartermaster Corps has embarked on a gigantic building program. This program calls for the rapid erection of temporary type, standardized structures which will provide for the needs of the enlarged army at the lowest possible cost.

In order to eliminate all unnecessary delays in carrying this program to its completion, complete plans and specifications have been prepared for all of the types of structures needed. The preparation of the hundreds of blueprints and the ingenious standardization methods developed for constructing and equipping these buildings, all within a few months, is an almost unbelievable accomplishment.

This standardization has been developed to a remarkable degree. For example, all of the buildings, except the central heating plants, have the same basic construction. The walls consist of an interior surface of 1 x 6 in. board wainscot for the lower four or five feet with wallboard above, 2 x 4 in. studs, 1-in. sheathing, and 45 lb. prepared roll roofing and 1 x 2 in. battens on the exterior surface. Ceilings are of wallboard, with joists, an air space, rafters, 1-in. sheathing, and 55 lb. roll roofing making up the roof.

Although this is the standard type of construction, many other materials are listed as alternates. These alternates are provided for so as to make possible the lowest construction costs and to prevent local conditions and shortages of certain materials from delaying the program.

Because the number of men to be housed varies considerably with the different posts, it was necessary to design the buildings as units which could be combined to serve the need of almost any number of men. Where practicable, the housing is provided on the basis of the 125-man unit, consisting of two barracks (63-man capacity), one mess hall, one recreation building, one supply building, together with such facilities as to make them habitable. Where a larger unit is desired, four 63-man barracks are provided with a 250-man mess hall and the other necessary buildings.

†Associate Editor, HEATING & VENTILATING.

SOLDIERS FOR DEFENSE

ZATION HOUSING

program features low cost structures heated by either forced warm air or steam. Heating systems are highly standardized.

Typical Cantonments

The War Department has estimated that a typical cantonment in the northern zone, designed to accommodate one National Guard Division of approximately 19,000 officers and men, costs approximately $8 million of which $1 million is for utilities. The following buildings and facilities are required:

Item	No. Required
Barracks, Including Lavatories	316
Mess Halls (170 men each)	124
Storehouses (Co.)	130
Day Rooms (Co.)	130
Officers' Quarters (Individual)	4
Officers' Quarters (Barracks Type)	24
Officers' Messes	12
Administration Buildings	15
Fire Stations	3
Guard Houses	11
Post Office	1
Telephone Building and Equipment	1
Radio Building and Equipment (where reqd.)	
Post Exchanges	12
Theaters (1000 seating capacity)	2
Service Club	1
Recreation Buildings (1 per Regiment)	9
Warehouses	16
Motor Repair Shops	17
Gas and Oil Stations (12,000 gal. each)	204,000 gal.
Utility Shop	1
Infirmaries	9
Hospital	750 beds
Bakery	1
Laundry	1
Refrigeration Plan (Mechanical)	1
Incinerator (10 ton)	1
Magazines	
Utilities	
Target Ranges	

Where the camp is in the southern zone, where tents are used for housing troops, a camp for one division costs about $5 million and includes the following:

TEMPORARY BUILDINGS AND HOSPITAL FACILITIES

Item	No. Required
Officers' Mess	11
Enlisted Men Mess	125
Officers' Quarters (Individual)	4
Administration Buildings	16
Brigade Fire Stations	2
Division Post Office	1
Telephone and Telegraph Building	1
Post Exchanges	12
Recreation Buildings	10
Service Club	1
Infirmaries	9
QM Utility Shop	1
Motor Repair Shops	17
Warehouses (non-insulated)	27
Warehouses (insulated)	2
QM Gas Storage Units	17
Incinerator	1
Radio Transmission Building	1
Bakery	1
Laundry	1
Stockage Fence	2000 lin. ft.
Cold Storage Warehouse	1
Non-Climable Fence	750 lin. ft.
Magazines	
Target Ranges	
Lavatories (Enlisted Men)	120
Lavatories (Officers')	19

Fig. 1. A group of two-story barracks and other buildings located at Fort Dix, New Jersey. Barracks house 63 men and are heated with forced warm air coal-fired systems.

Hospital	
Nurses' Quarters Buildings	4
Officers' Quarters (Barrack Type)	2
Medical Detachment Barracks	6
Medical Clinic	1
Surgical Clinic	1
Physiotherapy Ward	1
Standard Wards	18
Combination Wards	8
Detention Wards	1
Mess (Enlisted Men Patients)	1
Storehouse with disinfecting facilities	1
Morgue	1
Enclosed Walk	3100 lin. ft.
Open Roofed Walk	3100 lin. ft.
Service Road	3000 lin. ft.
Heating Plant (Hospital)	1250 hp.

Reception Centers

At many of the camps reception centers must be provided to take care of the new men. A typical 1000-man reception center requires, in general, the following facilities, the approximate cost of which is estimated at $275,000. It consists of the following buildings:

RECEPTION CENTERS

Administration Building	1
Recruit Receiving Building and Warehouse	1
Guard House	1
Fire Station	1
Infirmary	1
Post Exchange	1
Recreational Building	1
Officers' Quarters and Mess	1
Barracks (5 per 250 Man Company, the lower floor of one Barracks in each Company to be used for Administration and Supply)	20
Cafeteria Mess (1000 Men)	1
Utilities, Telephone	

Northern and Southern Construction

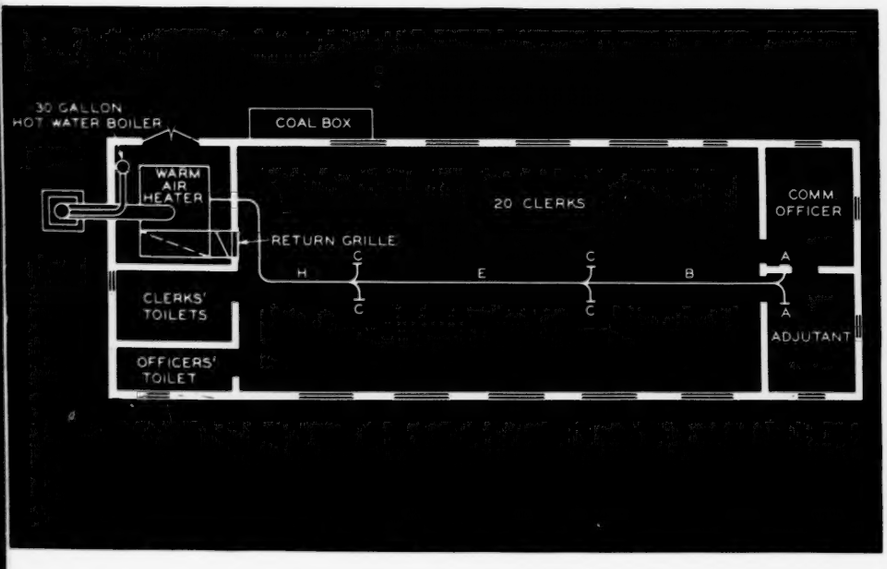
Two types of construction are planned for each type of building, one making it suitable for northern sections of the country and one for the warmer southern sections. The buildings located in sections where the outdoor winter design temperature is +20F or lower, are of the northern type, while those located where the design temperature is over +20F use southern construction.

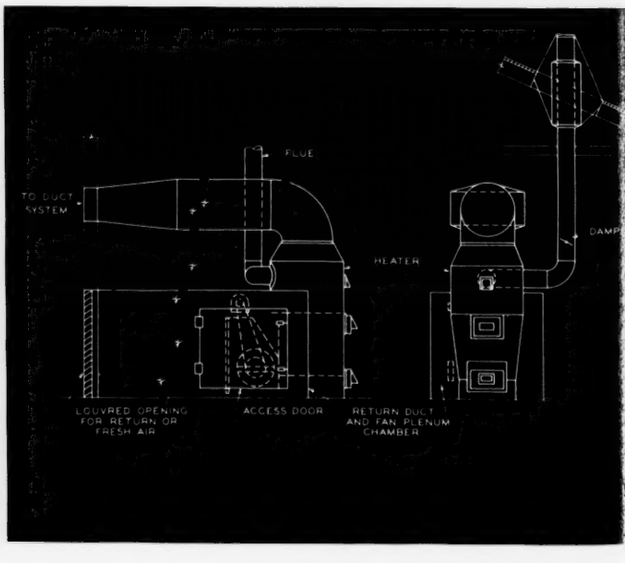
Heating Systems

The kind of heating system used depends on the type and size of the building. The simple, small buildings such as small mess halls, lavatories and bath houses have cannon stoves; the barracks, administration offices, larger mess halls, post exchange, post office, cantonment infirmary and clinic, have forced hot air systems; all bakeries, recruit examination buildings, service clubs, theaters and large mess halls have individual steam systems while all buildings in the hospital groups such as clinics, hospital barracks and quarters, mess halls and administration buildings have steam systems supplied from a central high pressure plant.

In order to standardize the design of these systems as far as possible the country was divided into three zones according to design temperatures. The first zone, designated as "X," includes all sections where the design temperature is between 0F and —20F, the second zone (Y), includes all sections with design temperatures between +20F and 0F, while the third zone (Z). covers all sections having a design temperature higher than 20F.

For each type of building there has been prepared a standardized heating layout which shows the location of the heating unit, whether stove, furnace, boiler or boiler plant, and also shows the method of heat distribution, whether by forced air ducts or steam pipe radiators and unit heaters. On the standard layout and next to each piece of equipment is a letter which determines the size of the equipment. For example, suppose a heating system is to be designed for a 20-clerk administration office, type A-8, located in the "Y" zone which has a 0F design temperature. If we look on the heating schedule table for that building and zone, we find the heater unit should have a capacity of 171,400 B.t.u. per hr., air discharge of 2900 c.f.m., and a static pressure of ¼ in. The recirculating grille should be 34 x 34 in.; while the stack size is 12 in.





The letter opposite the main duct is "H" and we find on the table of duct sizes that the size is 20 x 20 in. for the 0F zone. The first branches are lettered "C" which the table lists as a 14 x 14 in. duct. By following this procedure, the heating system can be designed in a very short time.

The same method is used for any of the other heating systems whether it is a cannon stove for a lavatory or a large central heating plant for a 2000-bed hospital. In this latter case, the letters designate the size of the boiler plant, according to the zone in which the hospital is located and then the standard plans for this size heating plant are consulted for the construction details. Steam distribution pipe sizes, radiators and unit heaters are selected in a like manner.

Cantonment Buildings

All of these buildings are individual units, at least in regard to the heating systems. In most cases the heating is either by cannon stove or forced hot air, although the bakeries always have steam systems and the other buildings have steam systems specified as alternates.

The standard construction is of the frame type with interior walls of 1 x 6 in. wainscoting, 2 x 4 in. studs, 1-in. sheathing, and rolled roofing, plywood or metal exteriors. The heater rooms in the buildings not heated by stoves are lined on the exterior wall with 8-in. concrete blocks while the heater room surface of the interior walls and the ceiling are lined with gypsum wallboard.

Where furnaces are used, they are of the forced type, with a centrifugal blower. Air is taken in either through

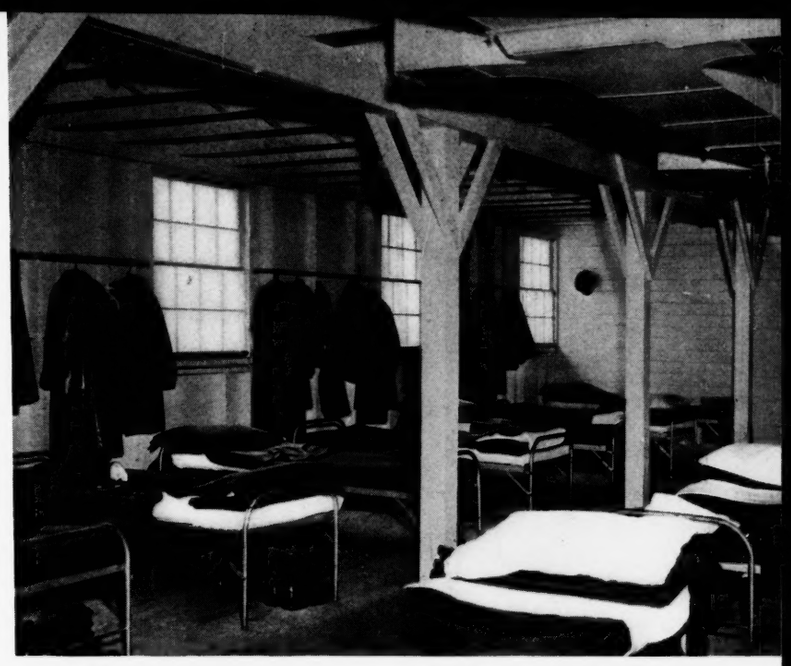


Fig. 4. Interior of first floor of a typical 63-man barracks. At the end of the room can be seen the concrete block walls of heater room with return grille close to floor. Heating supply ducts are shown at ceiling.

TABLE 2.—ADMINISTRATION BUILDING—WARM AIR DUCT SIZES, IN.

Symbol	— 20F	0F	+ 20F
A	9x9	8x8	7x7
B	10x10	9x9	8x8
C	15x15	14x14	11x11
D	16x16	15x15	12x12
E	18x18	16x16	14x14
F	20x20	16x16	14x14
G	20x20	18x18	15x15
H	24x24	20x20	18x18
J	24x24	22x22	18x18
K	30x24	24x24	20x20

TABLE 1.—ADMINISTRATION BUILDINGS—WARM AIR HEATING SCHEDULE

Buildings	Types A-4, A-5, A-6			Types A-7, A-8, A-9			Types A-10, A-11, A-12		
Zones	— 20F	0F	+ 20F	— 20F	0F	+ 20F	— 20F	0F	+ 20F
Heating Unit B.t.u./hr.	145,000	112,500	80,500	220,200	171,400	122,200	295,600	229,200	164,000
Heating Unit C.f.m.	2,400	1,900	1,400	3,700	2,900	2,100	4,900	3,800	2,800
Heating Unit Static Press., in H_2O	¼	¼	¼	¼	¼	¼	⅜	⅜	⅜
Return Grilles, in.	30x32	28x28	24x24	34x43	34x34	30x30	45x45	34x48	34x34
Coal Boxes	1	1	1	2	1	1	2	2	1
Stack Sizes, in. Sq. I.D.	12	10	10	14	12	10	16	14	12

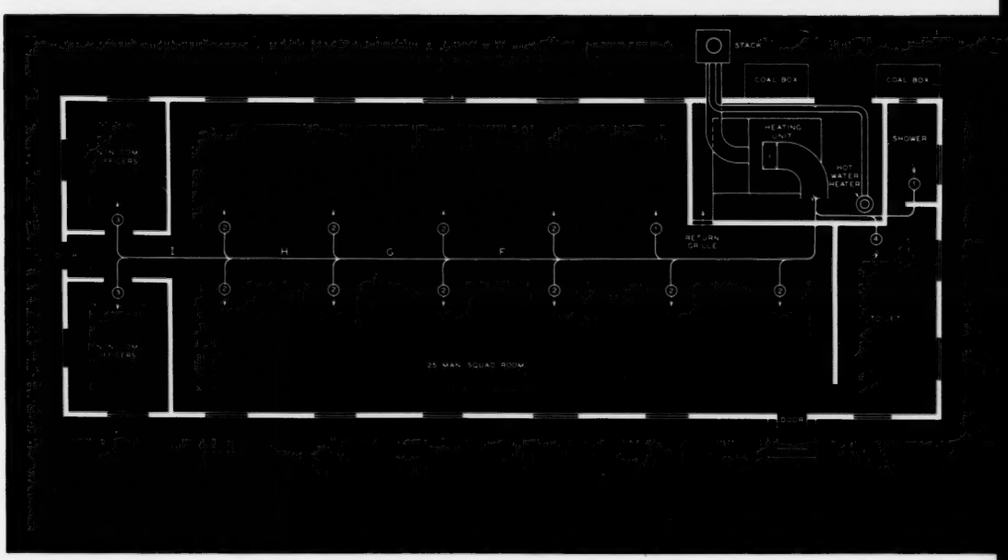


Fig. 2 (Extreme Left). Plan of a typical administration office for twenty clerks, a commanding officer and adjutant. A simple forced warm air heating system is employed and supply duct is run at ceiling. Letters indicate duct size as given in Table 2. Fig. 3 (Left). Typical cross section of forced warm air heating system as used for heating such buildings as administration, barracks, and mess halls. Furnace size is given in Table 1. Fig. 5 (Right). Plan of a 25-man squad room showing forced warm air method of heating. Supply duct is run at the ceiling.

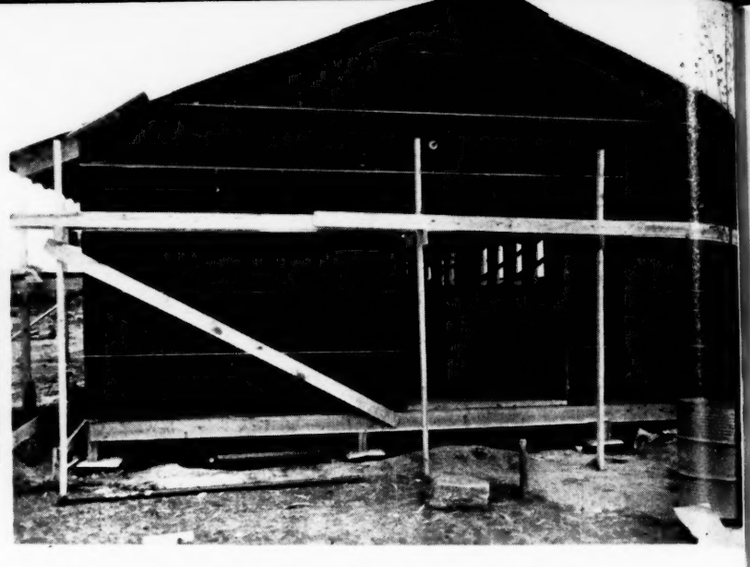
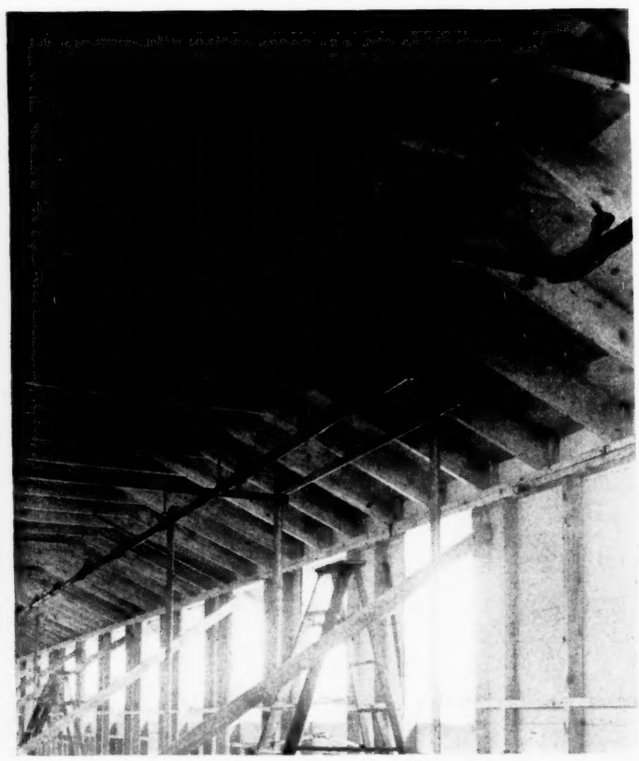


Fig. 6 (Left). Because of a delay in construction of the central steam heating plant for hospital buildings, a Pennsylvania Railroad locomotive is used to supply steam at Fort Dix, N. J. Generating capacity of locomotive is estimated at 250,000 sq. ft. steam radiation. Fig. 7 (Right). Front of one of the hospital buildings during construction. Steam supply pipes entering building are shown above doorway. Returns are beneath the floor.

a return grille in the heater room wall, about one foot above the floor or through an outside air inlet in the outer wall. It is discharged from the top of the unit to an overhead duct which runs the length of the building. In some cases, particularly in the smaller mess halls for 90 to 100 men, the hot air is simply discharged through a grille in the heater room wall.

In barracks, which are equipped with lavatories and showers, a service hot water heater is also provided in the heater room. Where the fuel is coal, coal boxes located outside of the building and next to the heater room wall are used for storage.

Other buildings in cantonment groups having forced hot air systems include guard houses; fire stations; clinic-veterinary and medicine; post exchanges; post offices; major general, brigadier general and regimental commander's quarters, motor repair shops, utility shops, store houses, radio buildings and telephone and telegraph buildings.



Buildings such as bakeries, large mess halls and service clubs have steam systems.

Bakeries are provided for all cantonments and vary in size according to the number of troops in the cantonment. Six standard size bakeries are used—ranging in size from the one-oven bakery which serves 1000 to 4000 men, to the six-oven bakery which can care for the needs of 35,000 to 45,000 men. These buildings are rather large and equipped with rooms for such uses as baking, mixing, proofing, office, bread, store, toilet and locker, firing, heater and fuel. The smallest building, which has only one oven, is heated by one boiler and has wall radiators in all the rooms. The other bakeries all have two boilers except the two-oven size and they all use propeller type unit heaters in all rooms except the showers, toilet, lockers and office.

Service clubs are provided, both for recreative purposes and to take care of the needs of visitors. They provide such services as guest rooms for visitors, recreation rooms for the men and their guests, and quarters for the staff. Two sizes of these buildings are available —one can take care of 60 guests and the other 118 guests. Both are heated by portable, firebox steel boilers, with a maximum operating pressure of 15 lb. per sq. in. The heating system is of the vacuum type with the main run at the ceiling of the first floor so that it is a down-feed system on the first floor and an up-feed system on the second floor. Guest rooms and the other small rooms are radiator heated while the large recreation room has unit heaters.

Hospital Group

Adequate hospital facilities are provided for all cantonments. The smaller cantonments have clinics and infirmaries for treating all but severe cases while the large camps have complete hospital facilities. The buildings which make up a hospital unit are designed so that they can be combined to give hospital groups with capacities ranging from 25 beds to as high as 2000 beds. They are all of the one-story type because of fire hazards.

Fig. 8. Interior of one of the hospital buildings showing expansion loop in steam supply main. Downfeed risers have not been installed.

The basic hospital group consists of a combination ward, nurses' quarters, administration building, officers' mess and quarters, enlisted men's mess, store house, barracks and boiler house. Such a group with only one ward has a capacity of 25 beds.

Larger hospitals have, besides a number of these basic units, additional buildings, such as surgical and x-ray clinic, physiotherapy building, medical clinic, detention wards, morgue, fire station, laundry, post exchange, dispensary, shop buildings, and recreation buildings.

Since there is a demand for high pressure steam for sterilizing and other purposes and since these buildings must be grouped fairly close together, they are all heated from a central plant.

This plant is generally located at the rear of the group and supplies steam through mains carried in the roofs of the covered walks which connect all of the buildings of the hospital groups. Condensate returns are hung from the joists below the floor of the walks. Vacuum pump stations are generally located at the lowest point in the system.

Steam is distributed to all hospital buildings at 100 lb. per sq. in. pressure. A pressure reducing station in each building reduces the pressure to 40 lb. per sq. in. for the steam sterilizers and similar equipment, and to 5 lb. per sq. in. for heating.

The boiler house itself is a wood frame structure with exterior walls and roof of 22 gauge corrugated metal. The small boilers in these buildings are fire tube type while large boilers are of the water tube type. All generate steam at 100 lb. per sq. in. To meet the demands of all possible hospital groups, 21 standard boiler houses, with capacities ranging from 80 to 1750 B.H.P., have been designed.

All of the hospital buildings are equipped with vacuum steam systems and cast iron radiators.

Reception Centers

The recruit receiving building is a large building which contains all the facilities necessary for handling the new men on their arrival at the post. This building is a two-story structure and is heated with a vaccum steam system. Radiators are used in all rooms except the reception hall which has unit heaters. A separate heating plant, located between the wings of the building is provided.

The type of fuel to be used depends on the locality and the cost. Hand or stoker fired anthracite and bituminous coal, magazine fired anthracite and national gas are all used.

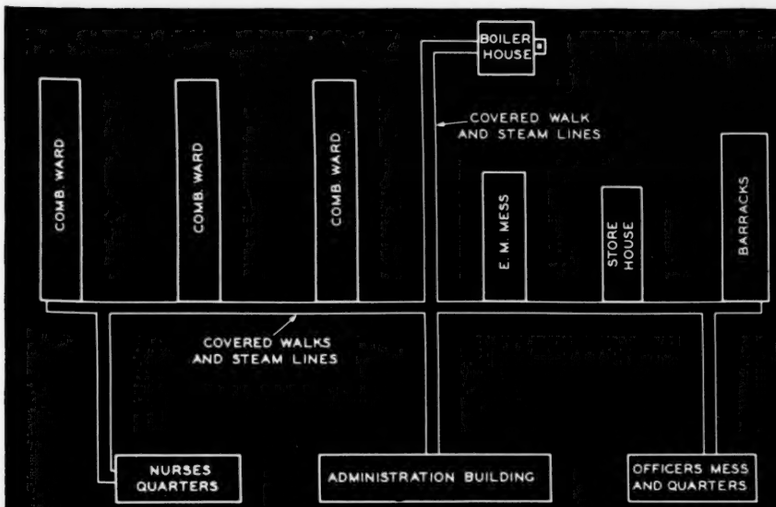
Personnel

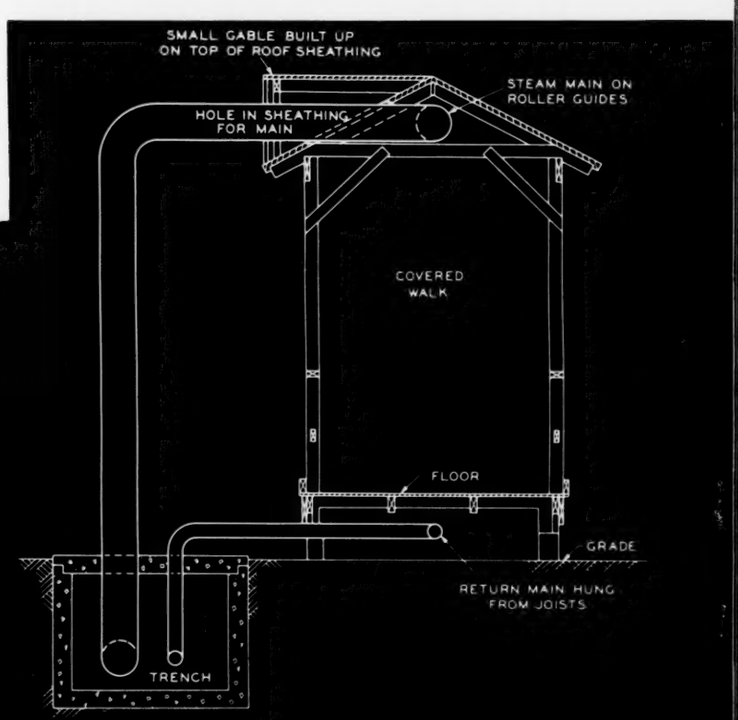
All of this work is being done under the general direction of Lt. Col. Brehon B. Somervell, Chief of the Construction Division, Quartermaster Corps. Major Elsmere J. Walters is in active charge of the work and is assisted by Captain Christian F. Dreyer, who is in charge of mobilization construction.

HOSPITAL BOILER PLANTS

Boiler House No.	Boilers Number of	Boiler Size B. H. P.	Boiler Size Sq. Ft.	Rated Total Capacity
1	2	40	——	80
2	3	30	——	90
3	3	40	——	120
4	3	50	——	150
5	3	60	——	180
6	3	72	——	216
7	3	90	——	270
8	3	107	——	321
9	3	133	——	399
10	3	152	——	456
11	3	175	——	525
12	3	200	——	600
13	3	250	——	750
14	4	214	——	856
15				
16	2		4000	800
17	2		5000 4000	900
18	2		6000 4000	1000
19	3		2 - 4000 1 - 3000	1100
20	3		2 - 5000 1 - 4000	1400
21	3		2 - 6000 1 - 5000	1700

Fig. 9 (Below). Plan of arrangement of hospital buildings for 75-bed hospital. High pressure steam is distributed from the boiler house in the rear through the covered walks to various buildings. Larger or smaller size hospital groups may be built simply by adding or subtracting standard buildings. Fig. 10 (Right). Cross section of covered walks at the point where a steam main and returns are brought into a tunnel. Supply main is run overhead while return main is hung from the joists.





THE ELECTRIC

builds 142,000 sq. ft. plant for production of torpedo boats for Mosquito Fleet. Plant heated by oil-fired duct system, office by forced hot water. Woodworking operations require extensive exhaust ventilation.

MARINE history has been written during the last few months when the Navy tested out its new torpedo boats belonging to the so-called Mosquito Fleet. These fast craft, powered by Packard motors, carry torpedo tubes and machine guns and attained high speeds in tests in the East River.

These boats are part of a fleet of torpedo boats and sub-chasers provided for in a $15 million appropriation.

The building of these boats is on a production basis heretofore unequalled in the new 142,000 sq. ft. Elco plant of the Electric Boat Company in Bayonne, N. J., designed and built by The Austin Company in 75 days, during which the plans were drawn, 1446 piles driven and a large fill made.

Sub-chasers and torpedo boats built here are rolling through this progressive production setup. Taking form four abreast in the two 70-ft. monitor aisles where monorail conveyors have been installed, these sleek naval craft are assembled on welded cradles of special design.

Thus while progressive assembly, finishing operations, painting, and the installation of tanks, motors, controls, and deck houses are carried on at three separate positions in each of the four parallel production lines, each boat moves right through on its own individual cradle.

The plant illustrates private industry's ability to get under-way when additional plant facilities are required to meet the demands of government contracts.

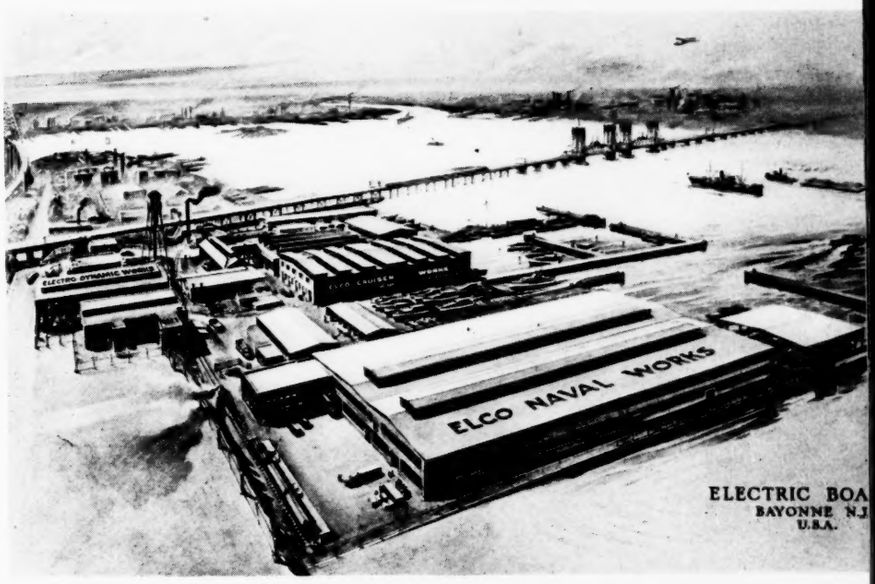
In sharp contrast with even the most progressive boat-building operations of the past, parts move into the assembly line of the new plant from all sides and every operation is carried on under conditions con-

TORPEDO BOATS

FOR DEFENSE

BOAT COMPANY

The Electric Boat Company's new plant, shown at the right, was designed and built by The Austin Company in 75 days.



ducive to efficient, quality workmanship. All primary wood-working and metal-working operations are concentrated in the 50-ft. aisles on either side of the assembly area, while deck houses are completely assembled on a mezzanine at one end of the plant, above the general parts storage department, large locker rooms and lavatories.

A modern, two-story office building, 50 ft. x 100 ft., adjoins the plant and provides ideal accommodations for the company's own engineers and naval inspection personnel.

Factory Heating

The factory itself, 420 x 241 ft. in plan, is heated by two Lee Engineering Company's direct-fired heaters each of which has a capacity of 55,000 c.f.m., and which are connected to approximately 3000 lineal feet of ductwork extending through the plant. These heaters are located on opposite sides of the plant and each serves two mains running longitudinally through the plant and across the ends. The furnaces are fired by Todd oil burners. Each heater is mounted on a specially built mezzanine, one at either side of the building and with a fresh air duct leading from the outside wall to the heater. No air is recirculated. Operation of the oil burners is manually controlled.

The main ducts run around the outside walls (see Fig. 10) with branches taken off at short intervals to downcomers which feed the warmed air to the building near the floor level. Tuttle & Bailey Ducturns are used in the ductwork between the heaters and the main.

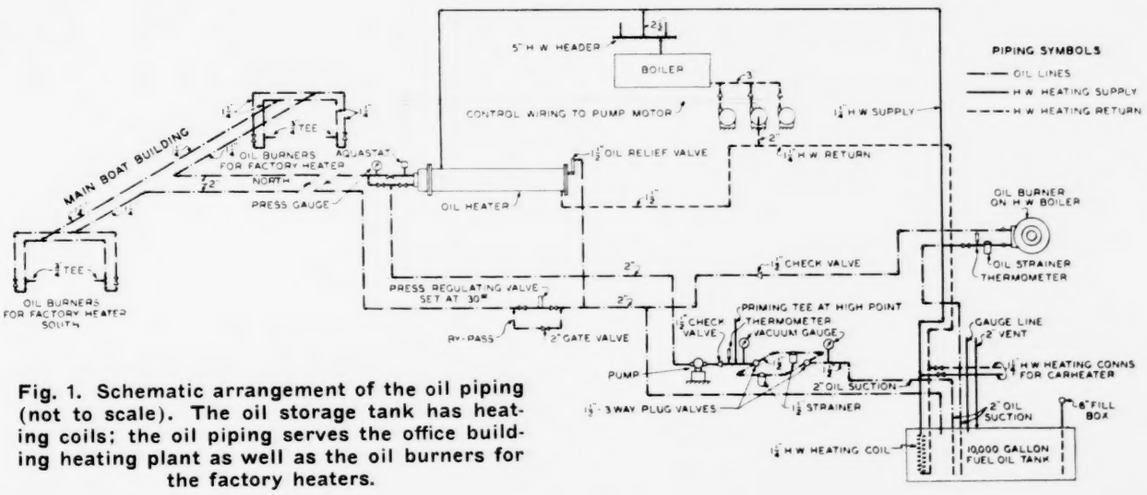


Fig. 1. Schematic arrangement of the oil piping (not to scale). The oil storage tank has heating coils; the oil piping serves the office building heating plant as well as the oil burners for the factory heaters.

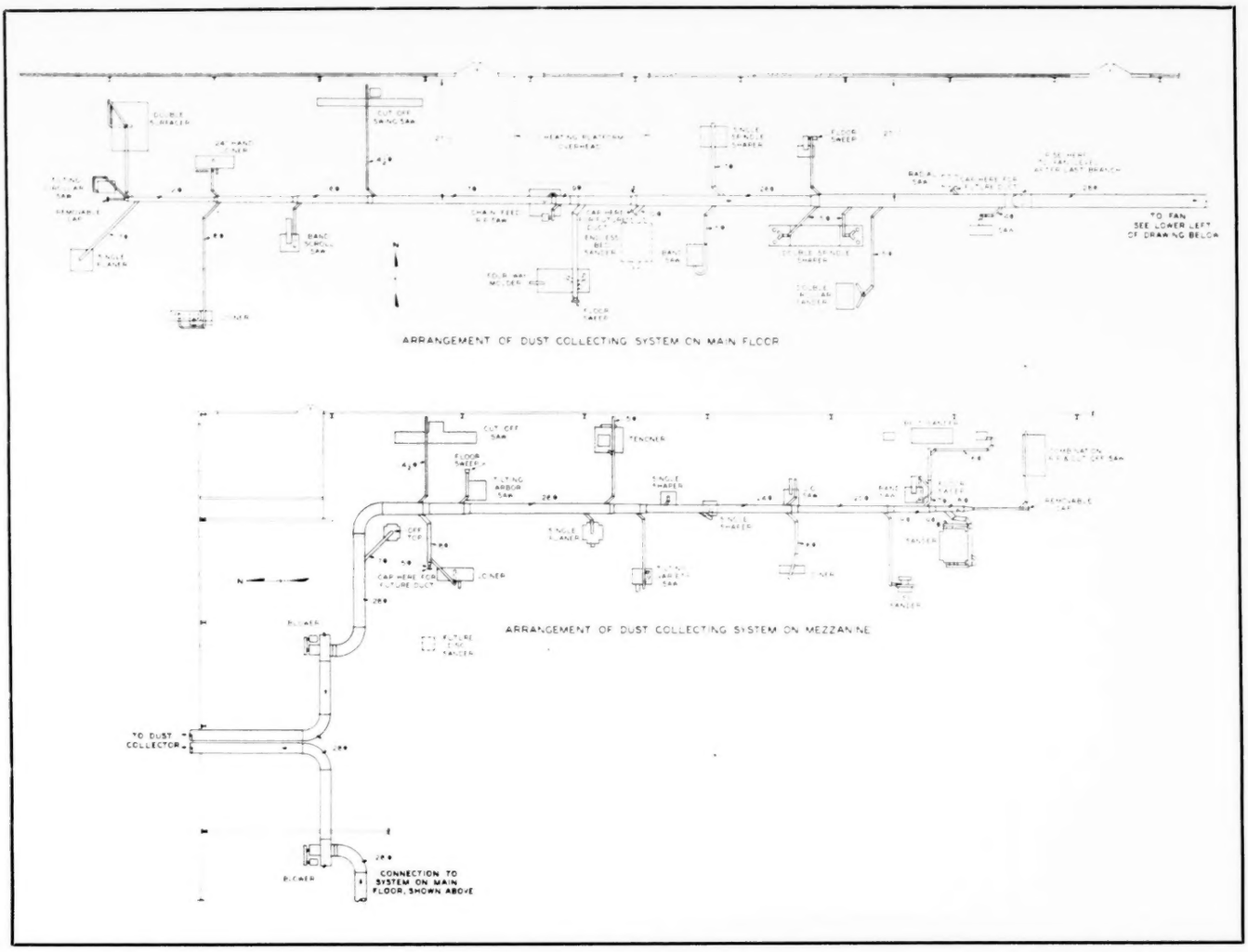

ARRANGEMENT OF DUST COLLECTING SYSTEM ON MAIN FLOOR
ARRANGEMENT OF DUST COLLECTING SYSTEM ON MEZZANINE
TO DUST COLLECTOR
CONNECTION TO SYSTEM ON MAIN FLOOR, SHOWN ABOVE

Fig. 2. General arrangement of the dust collecting system serving the wood working machinery. For convenience in illustrating this system it is shown in two parts above. Actually it is all one system serving machinery located along the north and east walls.

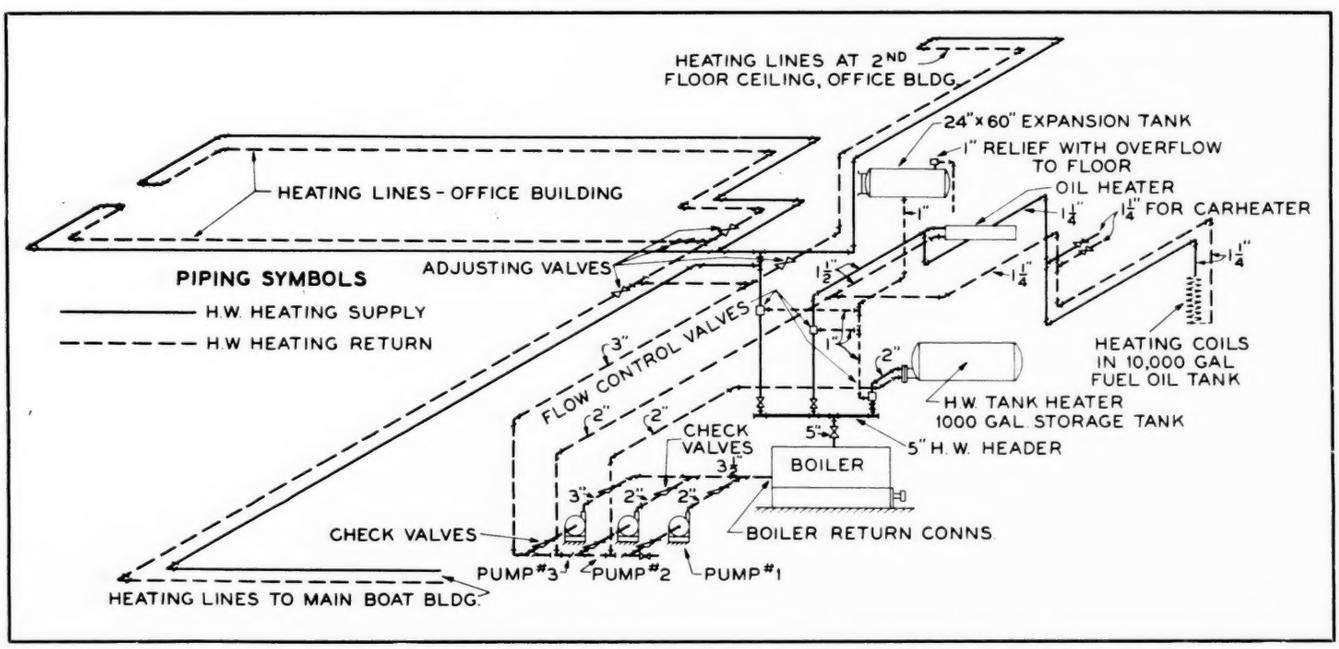


Fig. 3. A schematic diagram (not to scale) showing the arrangement of the hot water heating piping to the office building, car heater, hot water storage tank, fuel oil pre-heater, and oil storage tank. This system is entirely distinct from the direct-fired system serving the factory building.

Fig. 4. One of the direct-fired heaters in the main boat building. Typical downcomers can be seen along the wall in the center and right and on column in the left foreground.

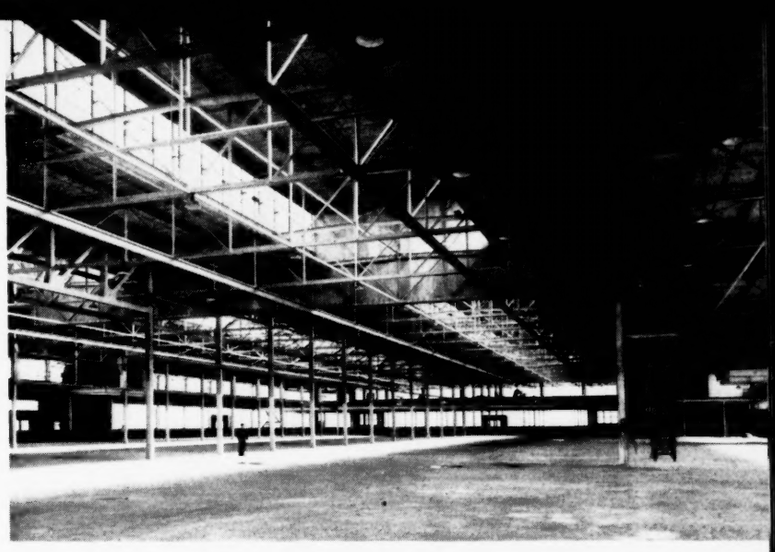


Fig. 5. Interior view in the main boat building looking East. The direct-fired units can be seen at both the left and the right, overhead.

Office Heating

The office building, which houses the offices and drafting room, is heated by a forced hot water system. A Pacific boiler fired by a Petro burner, and having a capacity of 10,000 sq. ft. of radiation, is connected by a 5-in. header to a two-pipe system. A thousand gallon Whitlock storage tank, heating coils in the 10,000-gallon fuel oil tank, a carheater, and a Whitlock oil preheater are all supplied with heat from the same system. Three Thrush water circulators and flow control valves, together with adjusting valves in the mains, are used. The system is illustrated schematically in Fig. 3.

The office building is of two floors and measures 50 x 110 ft. in plan. The general offices are located on the first floor with the drafting room above. Both floors are heated by Trane convectors, located in most cases beneath the windows. The air temperature is controlled by a single thermostat located approximately in the center of the general office floor and connected to heating pump No. 3 in the boiler room, which is located at one end of the ground floor.

An American Blower unit heater takes care of the large heat loss in the reception room while the toilets are ventilated by a 12-in. Ilgair propeller fan.

The boiler is connected to a 20 x 20 in. chimney. In the breeching there is installed a DeBothezat Bifurcator induced draft fan which is controlled from the oil burners.

Hot water supply from the 1000-gallon storage tank is circulated by a fourth Thrush circulator controlled from a Minneapolis-Honeywell aquastat located on the return line from the supply fixtures. Pumps No. 1, 2 and 3, respectively, serve the tank heater under control from the aquastat on the return and the hot water heat-

Fig. 6. Sub-chasers and motor torpedo boats are rolling through a regular production line at the Electric Boat plant.

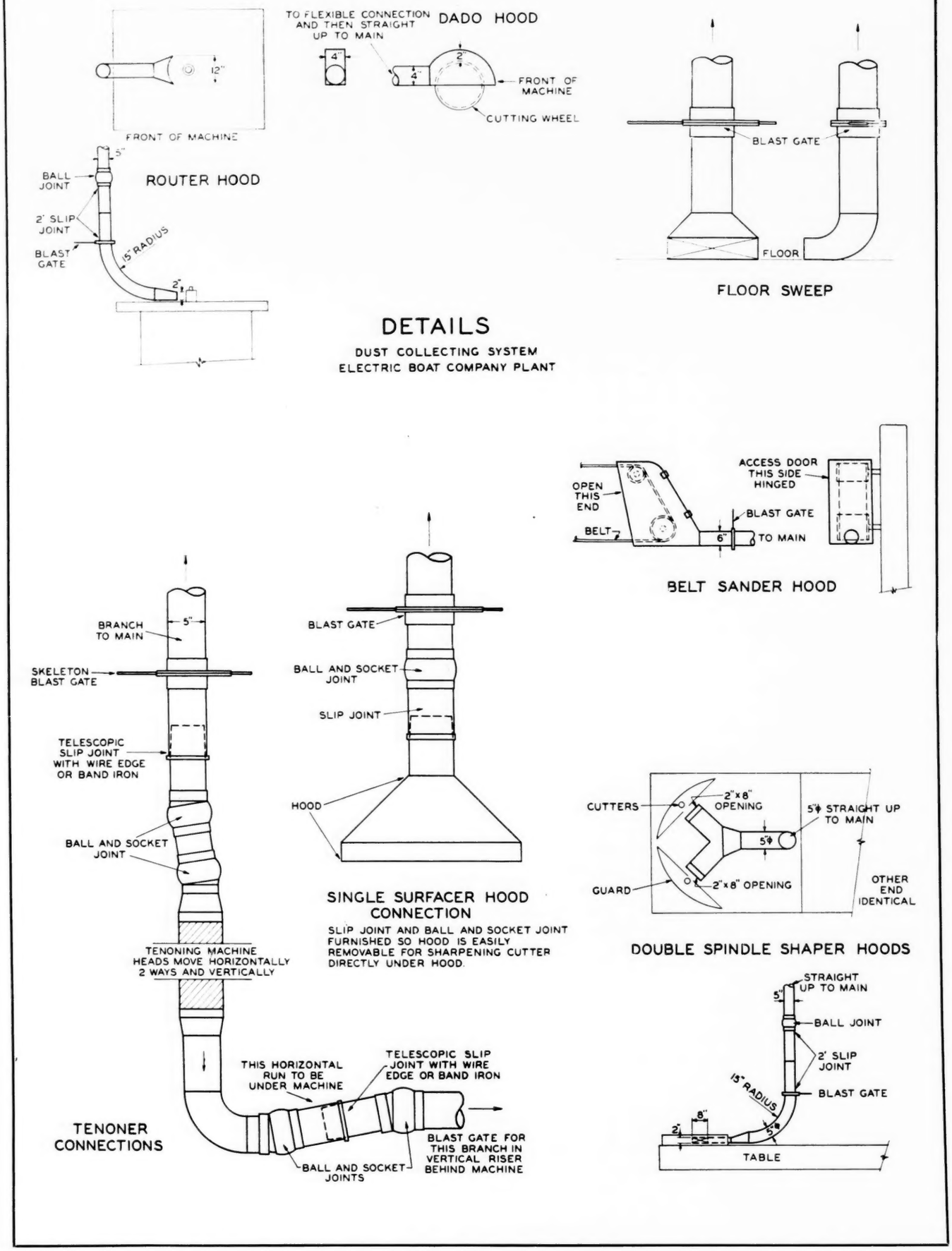


Fig. 7. Details of the hoods and machinery connections for the dust collecting system serving wood working machinery in the Elco plant of the Electric Boat Company.

Fig. 8. The new addition to the plant of Electric Boat Company in Bayonne, with the dust collector for the woodworking department shown in the foreground.

Fig. 9. Close-up of one of the direct-fired heating units in the main boat building, showing the location on a balcony, thus saving floor space.

ing system controlled from the thermostat in the general office.

The oil piping which serves the oil burner in the office heating plant as well as the burners in the factory heaters are illustrated in Fig. 1, which shows the oil preheater and heating coils in the oil storage tank.

Dust Collection

Since the plant is primarily engaged in woodworking processes, adequate provision has been made for collecting the dust and shavings. One large system has been designed and installed to serve the woodworking machinery which is located along the north and east walls of the building. About half of the machinery connected to this system is on the main floor along the north wall, the other machine being on a mezzanine along the east wall. See Fig. 2.

A main, tapering from 28 in. in diameter to 4½ in. at the last machine, serves the mezzanine machinery which includes a cut-off saw, joiners, several single shapers and sanders. The main floor duct also tapers from 28 in. to 5 in. at the far end, and serves single planers, moulders, spindle shapers, and so on.

Each of the mains is connected to a 14,500 c.f.m. 25 hp. American Blower fan with the outlet ducts running to the dust collector mounted on the roof.

As far as possible branches to the main are made at an angle of 30° and under no case is the angle between the center lines greater than 45°.

The system is designed for a 2 in. average suction with all outlets open. Blast gates are installed in each branch. Hoods are of 20 gauge galvanized steel, with ductwork gauges as follows: 4 to 16 in.—24 gauge; 17 to 24 in.—22 gauge; 25 to 32 in.—20 gauge. The cyclone collector, which is mounted on the roof, is of 18 and 20 gauge, and is 10½ ft. in diameter with a 30 in. vent and 16 in. outlet.

Details of connections to individual machines are shown in Fig. 7.

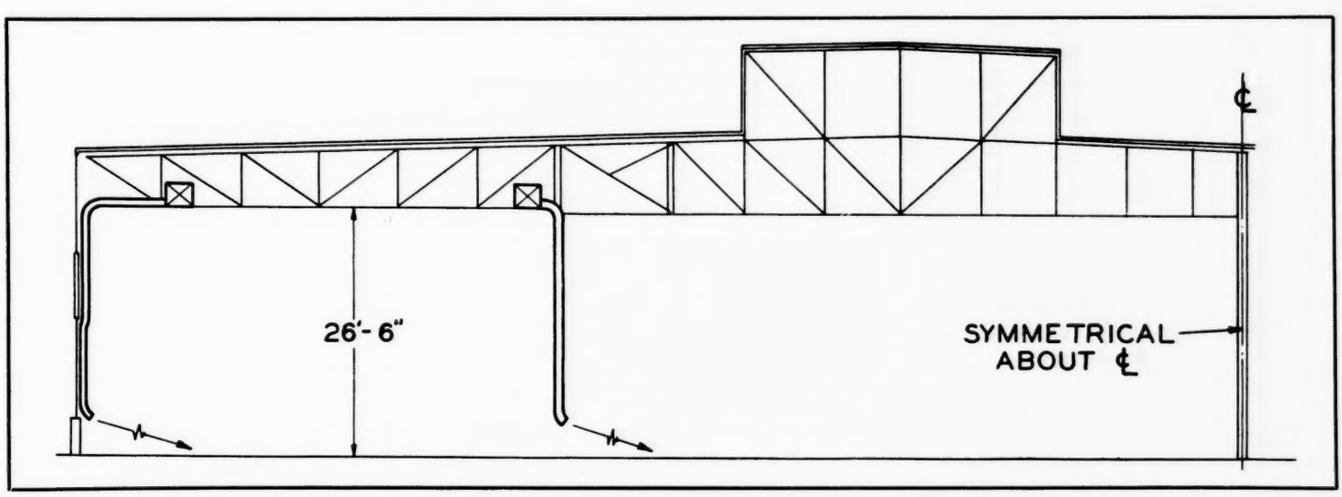


Fig. 10. Cross section through the new factory building showing half the building. The other half is symmetrical about the center line. This drawing shows the location of the longitudinal ducts in the truss work and the downcomers supplying warm air along the floor. This arrangement is repeated on the other side of the building served by other heater.

THE EDO AIR

hardly completes addition to its pontoon plants when defense measures make necessary still further expansion. Heating and ventilating of existing plants, addition, and plant now under construction are here described.

Fig. 1 (Left). The new building for the Edo plant now under construction. The sloping parapet is designed to minimize effects of concussion in case of bombing. The steel sash is slanted so that the glass will deflect the sun's rays downward.

The 1939 addition for Edo Aircraft, as well as the new plant now under construction, was designed by Brown & Matthews, Inc., engineers and constructors, and by Evans Moore & Woodbridge, architects, both of New York.

ONE of America's young industrial plants, the Edo Aircraft Corporation, was founded 15 years ago. The company's original plant was located along the shores of Long Island Sound in College Point, New York, where the company concentrates on its single product—all-metal pontoons for seaplanes, of which it is said to be the largest manufacturer in the world. Since present-day pontoons are made

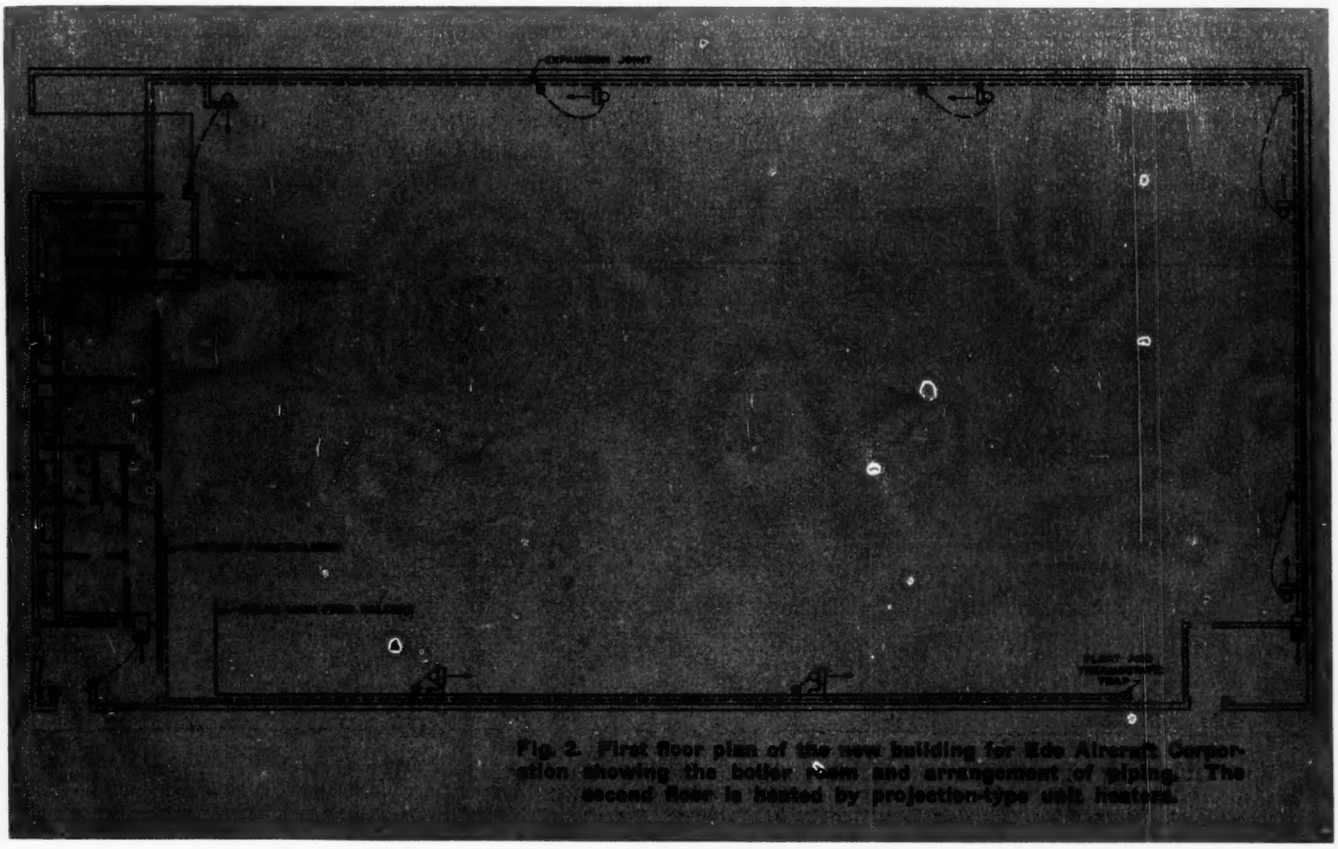


Fig. 2. First floor plan of the new building for Edo Aircraft Corporation showing the boiler room and arrangement of piping. The second floor is heated by projection-type unit heaters.

CRAFT CORP.

of aluminum their manufacturing and fabrication are such that the plant requires no cranes or heavy manufacturing equipment. Consequently, the problem of heat distribution is not so complex in this type of plant.

Original Plant

The original plant is heated by nine Buffalo Forge unit heaters operating under thermostat control from thermostats located adjacent to each heater.

Simultaneously with increased activity resulting from defense plans in 1939, the company expanded its factory by adding a brick and steel sash one-story structure including a two-story office building. This plant was completed late in 1939.

At the time the 1939 addition was built a new boiler plant was built to heat both the old plant and the new addition. For this purpose a separate brick building, adjacent to the old plant, was built to house a 25,000 sq. ft. Oil City fire-tube boiler powered by a Clark oil burner. The fuel, No. 6 oil, from a 5000 gal. storage tank, is pre-heated. The steam, generated at 5 lb., leaves the plant through a 10-in. main off which a new 8-in. branch was taken to serve the new offices and addition. The old piping, serving the nine unit heaters, was hooked into a new main. The condensate from the old plant is returned through a Jennings vacuum pump with a 3-in. return entering the boiler from both the old plant and the addition.

Located in the original plant are three exhaust systems, one serving belt sanders, a disc sander, and a buffer. The hoods from each of these machines join into one trunk which leads into a 1-hp. motor-driven fan which discharges through a vertical riser leading to a dust collector located on the roof.

There is one natural draft exhaust system in the plant which removes the fumes from a heat treating furnace through a 12-in. riser which exhausts through the roof.

All exposed parts of pontoons are coated with the peculiar colored paint called for by Navy specifications

PONTOONS
FOR DEFENSE

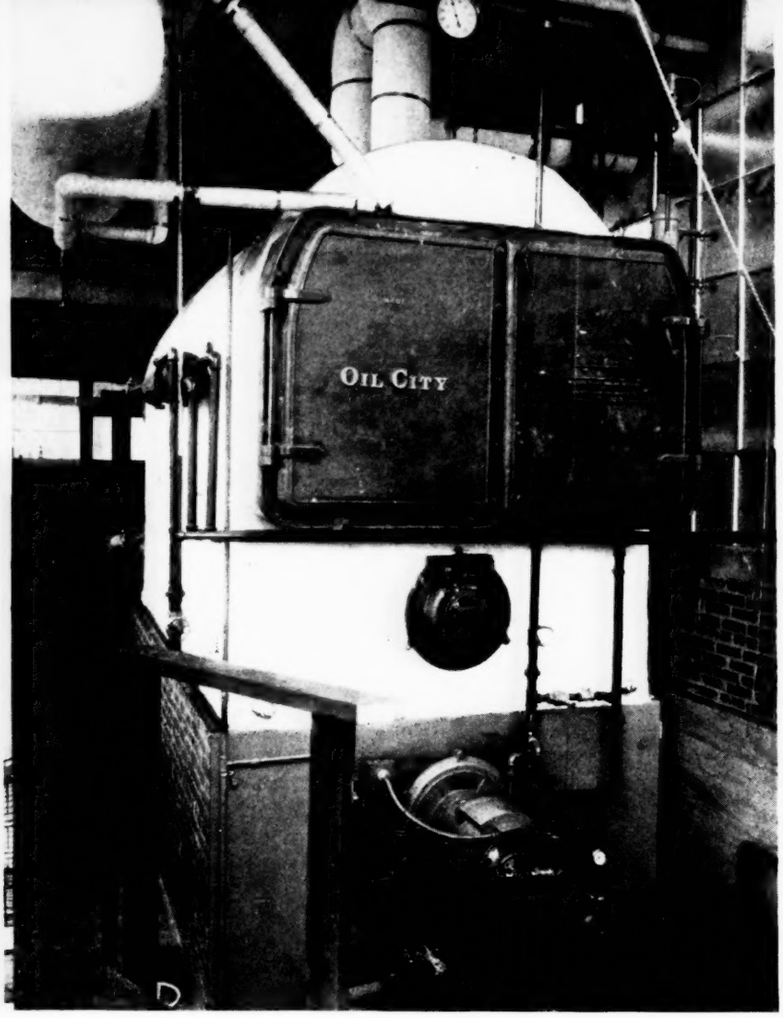


Fig. 3 (Above). Unit heaters serving the addition to the Edo plant. Note the large amount of glass wall surface and the type of roof construction used.

Fig. 4 (Left). The boiler plant serving the original building and addition.

and these are painted in booths located at one end of the old plant. Fumes are removed from each by a 40-in. round duct connected to a single 10-hp. motor located on the roof in a fan housing.

Immediately adjacent to the paint spray booths is a 7 x 30 ft. anodizing tank and two smaller hot water cleaning tanks both heated by steam from the heating boiler. The fumes from the anodizing tank are exhausted by a single duct running longitudinally along one edge of the tank and open to the tank by a longitudinal slot. At the wall end of the tank this duct connects to a Coppus blower which exhausts to the atmosphere.

1939 Addition

The addition, as mentioned, is used both for factory space and as office space. The factory area is heated by five Autovent unit heaters, four of which serve the exposed walls of the factory space and each of which has a capacity of approximately 335,000 B.t.u. per hr. The fifth unit heater supplies the toilets and has a capacity of approximately 41,000 B.t.u. per hr. Each is individually controlled from a thermostat located adjacent to the heaters. Steam is supplied to the unit heaters through a 6-inch main which is later branched with each branch vented and trapped at its terminal and dropped into a dry return to which is connected a 10,000 sq. ft. vacuum pump. The office space is served by cast iron radiators with the condensate returning through a wet return.

New Plant

In the fall of 1940 the architects and engineers prepared plans for a new plant, now under construction, across the street from the original building. This building has been designed with three definite objectives in addition to its primary function of housing manufacturing processes, as follows:

(1) *Camouflage:* The roof and portions of the side wall of this structure have been so designed that they can be readily covered with a material so placed as to break the straight lines of the contour of the building. The side walls will be of steel sash and glass with the steel sash placed in a slanted position so that the glass will deflect the sun's rays downward;

(2) *Bomb Resistance:* The building has been designed to minimize danger to workmen resulting from effects of concussion. Reports from abroad indicate that the buildings which have best withstood the effects of bombing are those with a sturdy frame and the most flexible exterior shell possible. In this building there are no brick parapet walls nor sharp corners at the roof line to offer resistance to concussion. Masonry at the upper floors and at the corners of the structure has also been eliminated.

The building has a strong skeleton steel frame with an exterior wall surface as light as possible which, if blown out, will result in minimum damage to the structure or its occupants. The occupants in the interior are protected from flying fragments by a thick blackout curtain and a strong wire mesh screen extending from

the roof to the first floor of the entire perimeter of the building; and

(3) *Blackout:* Following intensive study of the problem the architects and engineers came to the conclusion that the cost of a windowless structure for blackout operation, which would require air conditioning, fluorescent lighting and some other minor features, would be more than double the cost of a windowed building. Evidence from Europe indicates that little can be done to protect a building from a direct hit and that even though a structure, itself, may be some distance from the point of explosion, the utility lines—gas, water and electricity—leading to the plant, may be destroyed by bombing which would completely put out of service an air conditioned and artificially lighted building. On the other hand, a plant not dependent on artificial light could at least operate in daylight. Consequently, it was decided not to air condition the building.

The building as designed and now being built is two stories in height, with a balcony or mezzanine at one end and consisting primarily of a glass and masonry shell. In one corner of the plant a boiler room is provided to house a single 21,000 sq. ft. Oil City steel boiler powered by a Clark oil burner burning No. 6 oil and connected to a 30 in. x 80 ft. steel stack.

Steam generated at 5 lb. leaves the boiler through two 6-in. and one 2½-in. mains, the last serving five cast iron radiators located in the offices and a unit heater in the stair-well with a capacity of 450 sq. ft. E.D.R. One 6-in. main serves five unit heaters, each with a capacity of approximately 696 sq. ft. E.D.R.; a smaller unit in a stair-well with a capacity of about 445 sq. ft. E.D.R., all located on the first floor; and

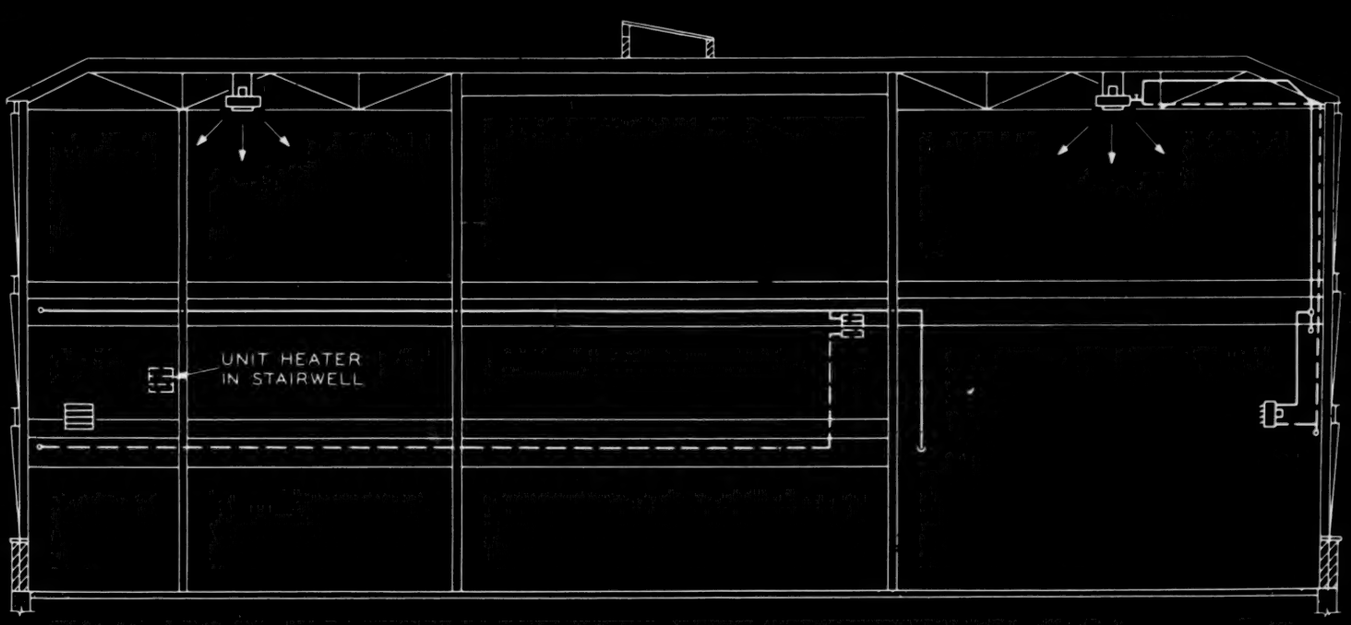
Fig. 5. The 1939 addition to the Edo plant with the office building in the foreground.

three projection type unit heaters on the second floor, each with a capacity of 838 sq. ft. E.D.R.

The other 6-in. main supplies heat for the balcony through a 175 sq. ft. and a 132 sq. ft. unit heater and then drops to an 838 sq. ft. projection type unit heater on the second floor and the remaining one, 696 sq. ft. projection unit heater on the first floor.

Each of the unit heaters is individually controlled from a thermostat located adjacent to the heaters. At the terminal of each main the line drops through a float and thermostatic trap into a return which feeds back to a Nash condensate pump and receiver located in the corner of the boiler room. All unit heaters are by Modine.

Fig. 6. Section through the new Edo building. Note the projection type unit heaters used on the second floor, the slanting steel sash, and the sloped parapets.



PANAMA CANAL

expands its housing facilities to meet the demands of the greatly increased personnel involved in the extensive defense program.

By F. F. KRAVATH†

THE recent authorization to appropriate $277 million for the construction of a third set of locks for the Panama Canal, and the other activity in connection with defense work on the Canal, has turned the attention of engineers to ventilating and air conditioning problems in the Canal Zone. Because of the scope of defense work in this area, and because it is expected that the new locks will require at least six years for completion, many buildings will have to be erected to take care of the needs of the workers.

The new locks will be wider, longer, and deeper than the ones which have now been in operation for 25 years.

It is estimated that the addition of the third set of locks and approach channels will increase the capacity of the Panama Canal to the point that it can sufficiently take care of traffic for a century or more. (Only the locks and approach channels will be new. Gaillard Cut, Miraflores Lake and Gatun Lake will, of course, be utilized.)

A rough idea of the immensity of the task may be gained from the following figures. The total excavation for the lock site will approximate 31,000,000 cu. yd., while the approach channels will require 44,000,000 cu. yd. excavation. There will be 4,800,000 cu. yd. of concrete used in the locks construction and 34,000 tons of material for the gate leaves and parts.

Climatic Conditions

Due to its location close to the equator, the Isthmus of Panama, naturally, has a tropical climate. While the temperature in the shade rarely exceeds 90F, averaging between 75F and 85F, it is constantly warm, and almost constantly humid.

The dry season, during which there is little or no rainfall, extends from the middle of December to the middle of April, while the rainy season occupies the rest of the year. From April to November it rains every day, averaging about 1¼ hr. of rain daily. The last four to six weeks of the rainy season, just preceding the dry season, accounts for the greatest amount of precipitation since it rains almost continuously. The average yearly rainfall on the Atlantic side of the Isthmus is 128 in. and is 69 in. on the Pacific side. The average relative humidity during the rainy season is approximately 88%, and is as high as 78% during the dry season.

†Office Engineering Division, The Panama Canal.

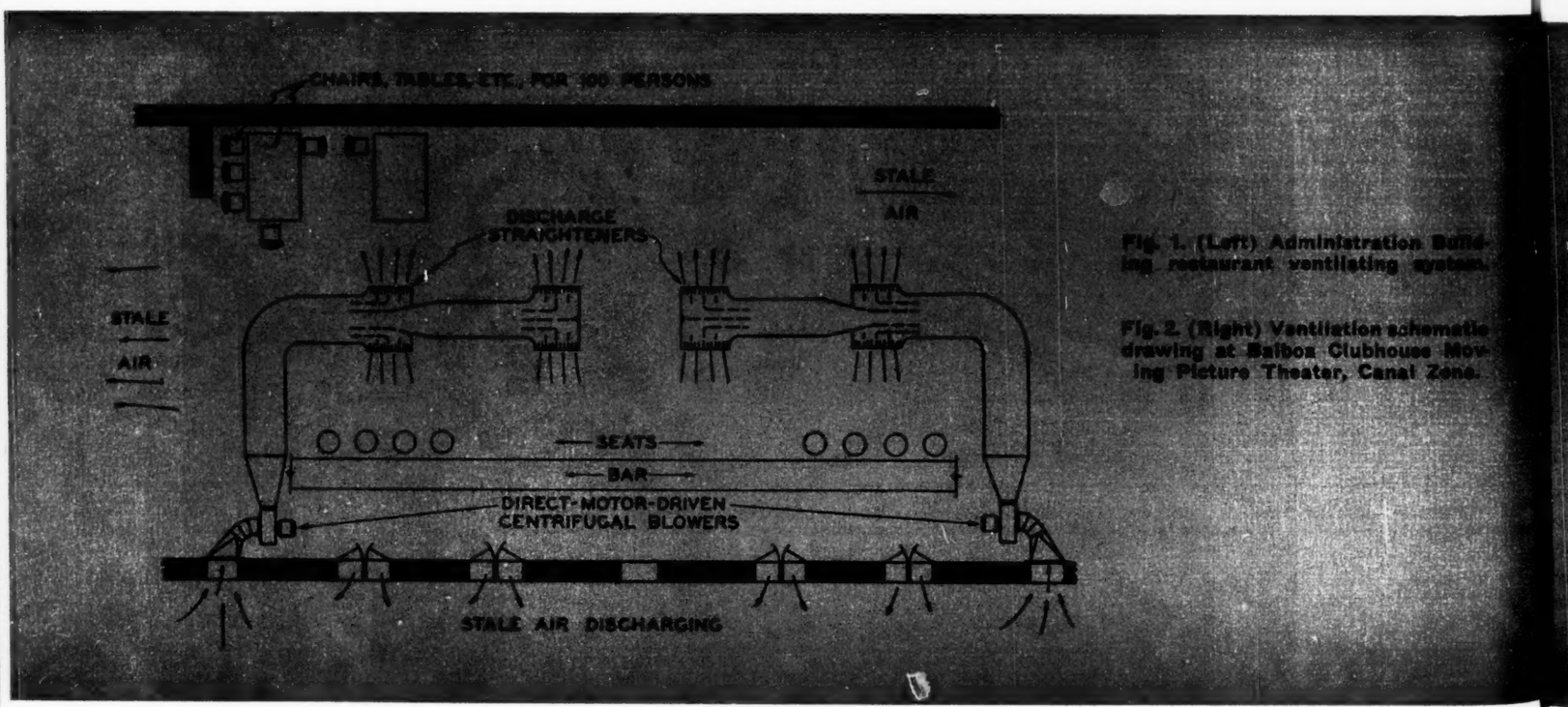
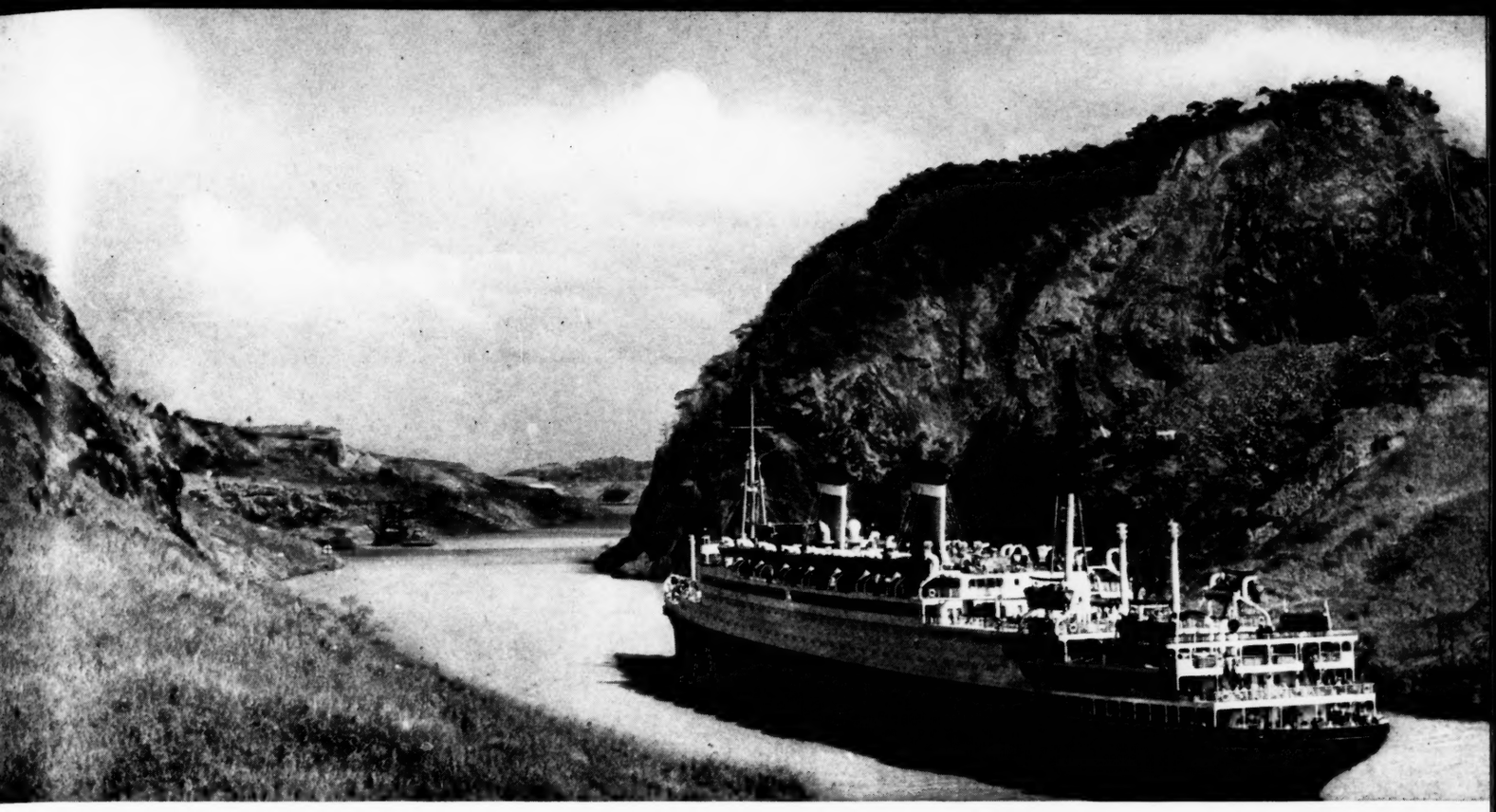


Fig. 1. (Left) Administration Building restaurant ventilating system.

Fig. 2. (Right) Ventilation schematic drawing at Balboa Clubhouse Moving Picture Theater, Canal Zone.



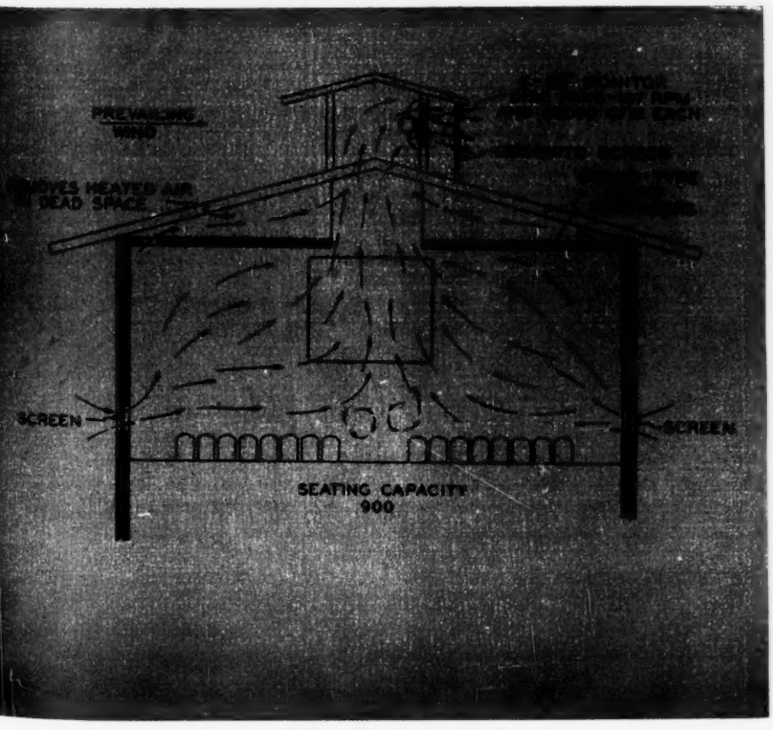
PANAMA CANAL

FOR DEFENSE

One of the redeeming factors about the climatic conditions is the prevalence of wind. With the exception of the months of May and June immediately following the dry season, there is always a cooling breeze sweeping in from either the Atlantic or Pacific Ocean.

Ventilation in the Canal Zone

From the time that the Panama Canal was first built, down to the present, it was recognized that ventilation of quarters, warehouses, terminals, offices, and workshops and laboratories would constitute a major problem, nevertheless a problem that had to be met. Not only was the question of comfort involved, but the more important aspect of health and prevention and elimination of disease governed.



Accordingly, since mechanical ventilation was at that time not nearly so advanced as it is today, and in any event economy and common-sense preclude the use of mechanical ventilation until other means have been proved to be insufficient, study was given to the contour of the land and the types of houses to be built thereon.

It was recognized that the houses would, of necessity, have to be of the cottage type, that they would have to be made as open as possible to allow for some air flow through the houses and that they would have to be screened to keep out mosquitoes, and other insects. In order to exclude dampness from the interior, an airspace of over 6 ft. was provided, and eaves were extended many feet from the building walls, in many cases multiple eaves being provided, one for each floor. Since elevation always enhanced the possibilities for natural ventilation, all hills, promontories, and the like were utilized wherever possible and structures were erected thereon. Easy drainage of rainfall was an added benefit. When, in certain cases, it was advisable that certain buildings be located in areas where there were no hills or natural elevations, if the buildings were important enough, hills were created. Such an example is the

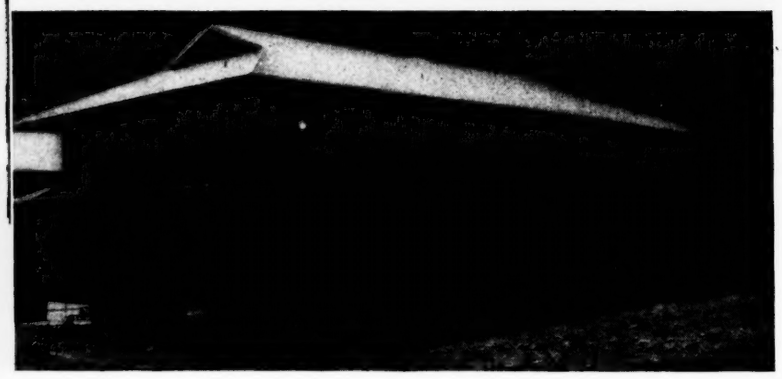


Fig. 3. (Upper) Administration Building at Balboa, Canal Zone. Fig. 4. (Middle) Bachelor quarters which are capable of housing as many as 44 men. Large air spaces over the second floor insulate the living space from the effect of the mid-day sun. Fig. 5. (Lower) A twelve-family apartment house. Cross ventilation is secured by arranging the rooms in line and by providing a front porch and a large screen.

Administration Building at Balboa which sits atop a man-made hill, 85 ft. above sea level.

That this type of construction has proven not only ample but completely satisfactory is proved by the fact that today few living quarters or offices have any other ventilation beyond the ventilation provided by nature and proper construction. Figures 4 and 5 illustrate the latest type of construction on the Canal Zone, particularly as regards ventilation.

In Fig. 4 is illustrated the bachelor quarters type capable of adequately housing as many as 44 men. Fig. 5 illustrates the 12-family apartment house. Both types are similar as regards the provisions taken to insure adequate ventilation. Both are well elevated, the first floor level being approximately 10 ft. from the ground. Both have high ceilings (approximately 10 ft.), and very adequate air spaces over the second floor to insulate the living space from the effect of the midday sun. Cross-ventilation is secured by arranging the rooms of the apartment in line (it will be noted that not every room has a window), by providing a front porch (in the case of the family apartment) which is screened but otherwise completely open from a 92-in. level to the ceiling, by providing a very large screened opening at the rear which also extends from the 42-in. level to the ceiling, and by providing room partitions, louvred at top and bottom to facilitate the movement of air from room to room. Since the hot, stale air rises to the ceiling, the open construction at the ceiling level with the accompanying drafts quickly dispels this air. To avoid drafts, the louvres at the bottom are made with relatively small openings so that only enough air for proper ventilation may readily pass. Excess air will go through the ceiling openings.

Mechanical Ventilation

In those buildings where many people are, of necessity, crowded into a relatively small space mechanical ventilation has been employed. One of such buildings is the Administration Building in Balboa. While, in general, this building has excellent natural ventilation, due to its large open windows and lofty position, the restaurant situated in the basement is not so fortunate since the windows there are relatively small and poorly located with regard to ventilation. Accordingly, two independent ventilating systems of the blowing type are being installed. A schematic diagram of this system is shown in Fig. 1. Air is taken in at a single window for each fan and distributed through four outlets in each system. Each outlet has a built-in splitter or series of guide vanes to distribute the discharging air equally over each outlet. For balancing between outlets vertical dampers of the blast-gate type are provided. Two systems rather than one were provided in order to keep the duct sizes at a minimum, provide for partial operation during most of the day at a saving in power and to offer greater all-around flexibility. Because of limited headroom, it was necessary to keep the duct sizing relatively small.

The restaurant, approximately 50 ft. wide, 125 ft. long, and with an 8 ft. 6 in.-ceiling, has a seating capacity of 150 at times, these times, in particular, being rainy days and generally very warm days.

Rather than provide merely enough air for good ventilation, it was desired to produce a cooling effect so the outlet velocity at each duct opening is approximately 500 ft. per min. Enough air is being recirculated to give a complete air change every three minutes. The fans in this case are centrifugal fans.

Another example of good ventilation is the moving picture theatre at the Balboa Clubhouse in Balboa. Here, as illustrated in Fig. 2, exhausting disc fans are placed in the monitor of the roof, air being drawn in through the continuous screens along both sides of the theatre. Here again, a cooling effect was gotten by circulating a greater than normal volume of air. So effective is it that a three-hour show may be enjoyed in utmost comfort even though the outside temperature is 85F and the humidity as high as 90%. The installation is cheap in first cost, in operation, and in main-

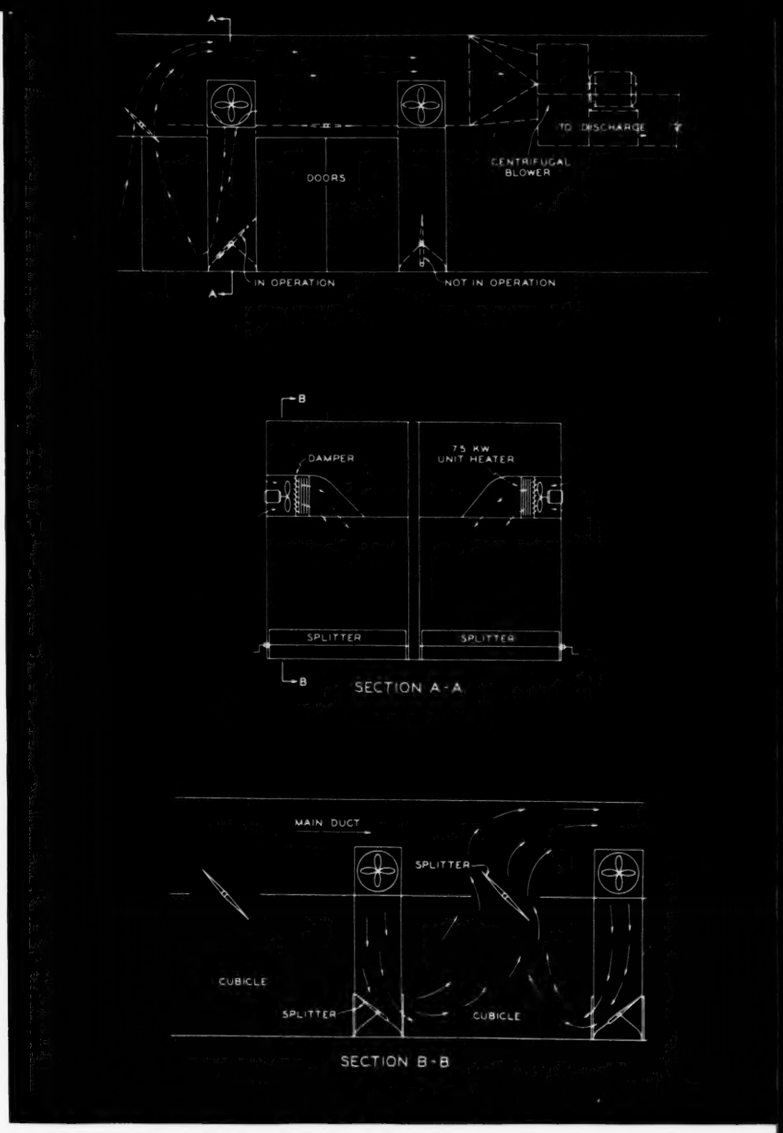


Fig. 6. (Upper) Schematic diagram of drying cubicles, Balboa Gymnasium, Balboa, Canal Zone. Fig. 7. (Middle) Section A-A. Drying cubicle ventilating system. Fig. 8. (Lower) Section B-B. Drying cubicle ventilating system.

tenance. It is very effective in operation, and both because the fans selected were large and slow-moving and they were arranged so as to exhaust, they are practically noiseless. So effective is the ventilation that smoking is permitted and carried on with no annoyance to non-smokers.

Due to the absence of ductwork, there being no recirculation necessary, disc fans, rather than centrifugal fans, are used with a subsequent substantial saving in first cost and operation.

Practically all of the theatres on the Zone are ventilated in this manner, as are some smaller shop buildings and warehouses.

Gorgas Hospital, constructed in the manner so typical on the Zone, sits on the slopes of towering Ancors Hill and as a result secures admirable ventilation by natural means. However, due to the enclosure necessary in certain rooms, mechanical ventilation must be employed. The X-ray room, for instance, is in the process of being air conditioned. This has been found advantageous in X-ray rooms throughout the world due to the need of a constant temperature, draftless, well ventilated area.

Drying Problem

One of the really serious problems on the Isthmus is that of drying clothing. While, as has been explained, the prevailing temperature is not unduly high, it is nevertheless high enough to cause intense perspiration with even a limited amount of physical exertion. Since the humidity is almost uniformly high, little evaporation of this moisture takes place, with the consequent complete wetting of one's clothing. While standing in a breeze may dry one's clothing, it will almost positively give one a cold. Hence, the custom in tropical climates is to avoid undue exertion or, if that is impossible, to change one's clothing. Since damp clothing in a damp climate will mildew, it is essential that this clothing be dried. Hence, in all quarters on the Zone there are included drying closets, large completely enclosed closets with an electric bulb or resistor screwed into a receptacle located about a foot from the floor. The heat from the bulb or resistor maintains a very satisfactory dry condition within the closet and is extremely effective.

For closets of approximately 4 ft. x 5 ft. x 7 ft. 6 in., a 100-watt lamp has been found entirely adequate. While the resistors, previously mentioned, are more efficient in the production of heat, the bulbs have the advantage of lighting the closet whenever it is desired to place or take articles from the chamber.

The Balboa Gym has a mechanical drying system for drying gym clothes, there being heavy demand on the facilities of this gym inasmuch as many Panama Canal and Panama Railroad employees, as well as high school and junior college students, are regular users of the equipment available.

Illustrated in Figs. 6, 7, and 8 are schematic diagrams of the dryer. A basket full of damp clothes will be placed in one of the cubicles and the unit heater serving that particular cubicle turned on. With the disc fans operating, air is drawn in from the room, is forced through the unit heater down to the floor level in the space between cubicles and then allowed to rise in the cubicle or drying space through the damper to the main duct running the full length of the cubicles. It then goes through the centrifugal blower and is discharged to the atmosphere.

The disc fans and unit heaters for each cubicle are started simultaneously, but there is an automatic temperature control on the unit heater which shuts the current off periodically. The unit is wired so that no more than two drying cubicles may be used at any one time, thus preventing excessive line loads. The bottom damper in Figs. 7 and 8 diverts the heated air to either the right or left cubicles. The damper at the top of each cubicle controls the movement of air through each drying unit. The system described has proved very successful in the service for which it has been used over a period of two and one-half years.

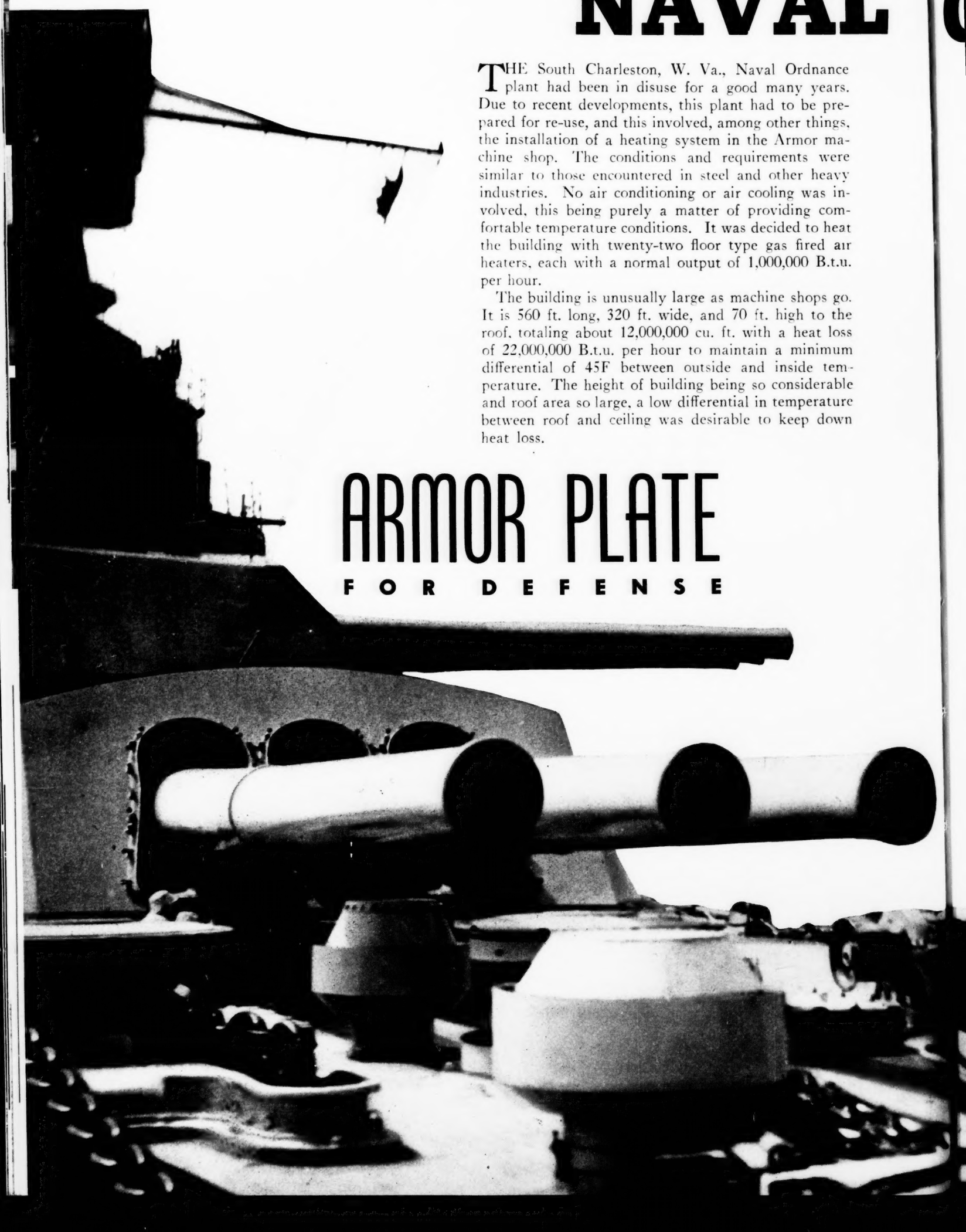
NAVAL

THE South Charleston, W. Va., Naval Ordnance plant had been in disuse for a good many years. Due to recent developments, this plant had to be prepared for re-use, and this involved, among other things, the installation of a heating system in the Armor machine shop. The conditions and requirements were similar to those encountered in steel and other heavy industries. No air conditioning or air cooling was involved, this being purely a matter of providing comfortable temperature conditions. It was decided to heat the building with twenty-two floor type gas fired air heaters, each with a normal output of 1,000,000 B.t.u. per hour.

The building is unusually large as machine shops go. It is 560 ft. long, 320 ft. wide, and 70 ft. high to the roof, totaling about 12,000,000 cu. ft. with a heat loss of 22,000,000 B.t.u. per hour to maintain a minimum differential of 45F between outside and inside temperature. The height of building being so considerable and roof area so large, a low differential in temperature between roof and ceiling was desirable to keep down heat loss.

ARMOR PLATE

FOR DEFENSE



ORDNANCE PLANT

at South Charleston reconditions its plant, installs unit heaters

By DAVID HENDERSON†

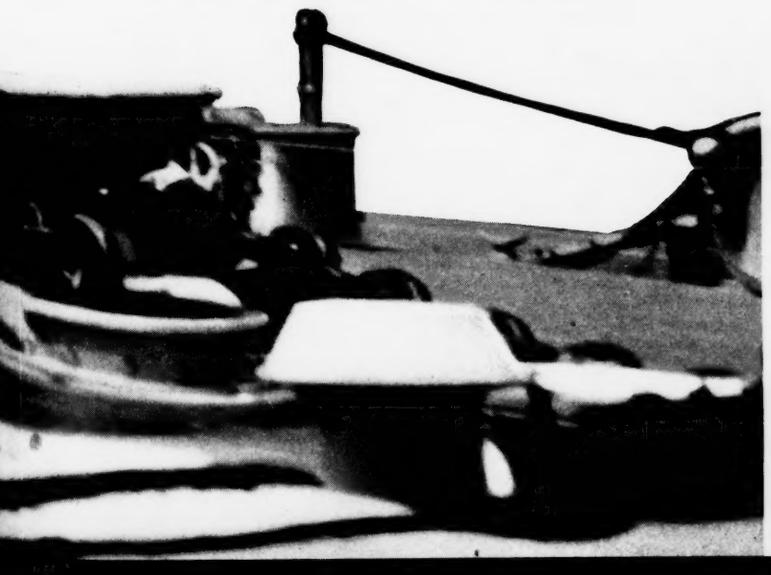
Fig. 1. Machine shop building at the Naval Ordnance Plant, South Charleston, W. Va.

A boiler plant located close to the building has two modern water tube boilers, each good for a peak load of 90,000 lb. per hour and fired with natural gas. The boiler plant was of proper size to supply steam to a large hydraulic press located in an adjoining building.

Consideration was given to steam heating the machine shop, taking steam from this boiler plant. Fired with natural gas and operating at 147% of rating, the efficiency of the boilers approximated 78%. The efficiency of the boiler at 100% of rating was not known, but it is believed to be something less than the 78%.

The hourly efficiency of gas-fired floor type unit heaters in this case approximated 84%. In terms of the entire heating season an average efficiency of 80% was assumed as being quite possible, and since there was no other loss, this efficiency could be regarded as the overall efficiency of the heating system for the season; that is, the ratio of the heat actually delivered into the building divided by the heat delivered by the fuel.

†Sales Engineer, Machinery Div., Dravo Corporation.



Since the steam boiler plant operated at peak efficiency at full output, the boilers would not be operating at their best efficiency when only supplying steam to the heating system. In addition, the length of the steam supply line around the building (1700 ft.) plus the length of the main outside the boiler plant, gave a total of approximately 2200 ft. of steam line which would result in a fairly large line loss. Consequently a fair assumption was that the overall efficiency of the steam system for the season would be around 60%.

The average number of degrees below 65F for the district are as follows: October 7.15, November 16.3, December 24.8, January 25, February 25, March 17, April 9.4.

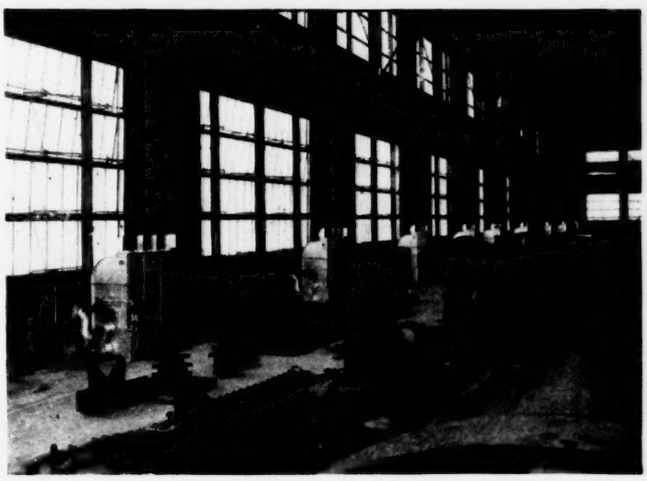


Fig. 2. This view shows how the unit heaters were spaced along the sides of the machine shop.

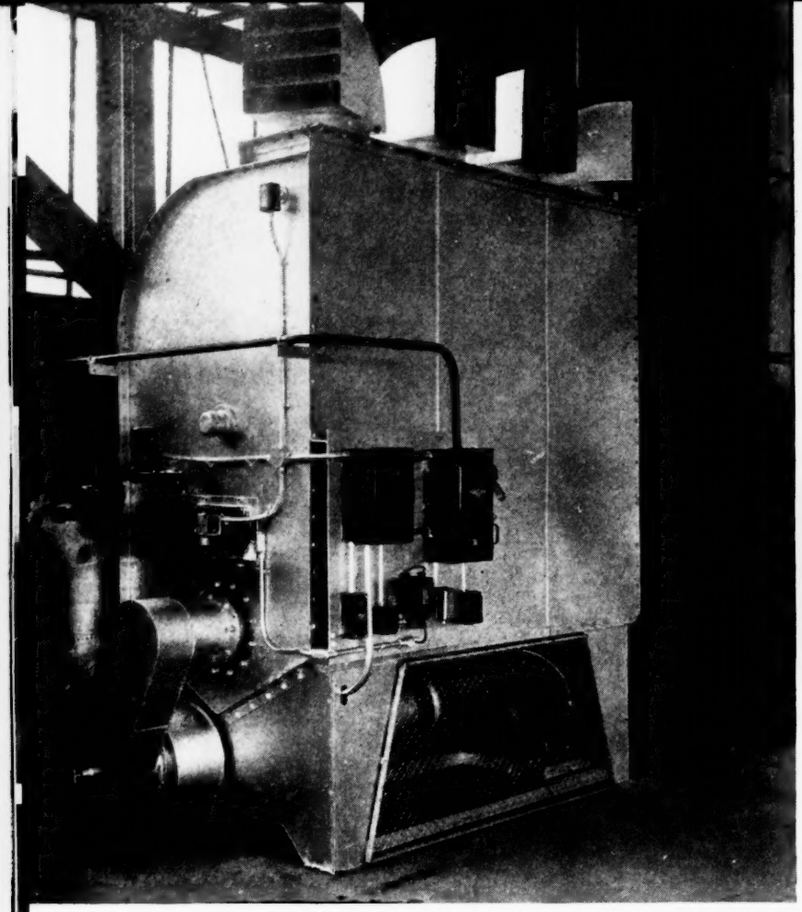


Fig 3. (Left) Close-up of one of the Dravo Corp.'s direct fired Lee unit heaters, showing intake fan at floor level, and elbow outlets at top. Fig. 4. (Above) View of the side of the machine shop building shows discharge vents for flue gases, which are not burned in the air stream.

Based on 22,000,000 B.t.u. per hour of heat delivered into the building to maintain a 45F differential the following tabulated data were arrived at:

Month	Average Heater Output B.t.u. Per Hr.	Average Hourly Demand in Pounds of Steam, Based on 1068 B.t.u. Per Lb. Plus 10% for Losses.	Per Cent of Boiler Rating
October	3,500,000	3600	10.6
November	8,000,000	8250	24.2
December.....	12,100,000	12480	36.8
January	12,200,000	12540	36.9
February	12,200,000	12540	36.9
March	8,320,000	8580	25.2
April	4,600,000	4730	13.9

Based on these figures and on the assumed efficiencies, the total gas consumption when using heaters would be slightly over 50,000,000 cu. ft. for the season, while with a steam heating system the gas consumption would be approximately 67,000,000 cu. ft. per season, or a saving of 17,000,000 cu. ft. in favor of direct firing.

With the right size boiler for the heating load alone the hourly efficiencies could be the highest obtainable, but in terms of overall efficiency for the season it was reasonable to expect a figure that would be well under 80%. The total cost of the steam heating system installed was more than the gas heaters, and if the necessary additional boiler were installed, this would have made the cost difference much more.

Based on these figures it was decided to use gas heaters and the selection was between the suspended type of heater and the floor type unit. The cost comparison, based on complete installation, was in favor of the latter. Fewer vent stacks would be required, 22 as against 138. Furthermore, since it is desirable to take the cold air to the heaters at floor level, a multiplicity of suspended units would have meant running intake ducts to the floor whereas the large capacity floor type units have their supply fans right at floor level. Another consideration was the fact that, in view of the large size of the building, substantial outlet velocities were necessary in order to assure covering the entire area with warm air.

In this building there is approximately 200,000 sq. ft. of roof. It was important, therefore, to keep down the differential of temperature between the floor and roof to insure a minimum loss through the roof. Every 10F increase in this differential meant an increase of approximately 1,000,000 B.t.u. per hour in the loss through the roof. The fact that taking air cold off the floor tends to keep down this differential argued in favor of using a floor type unit.

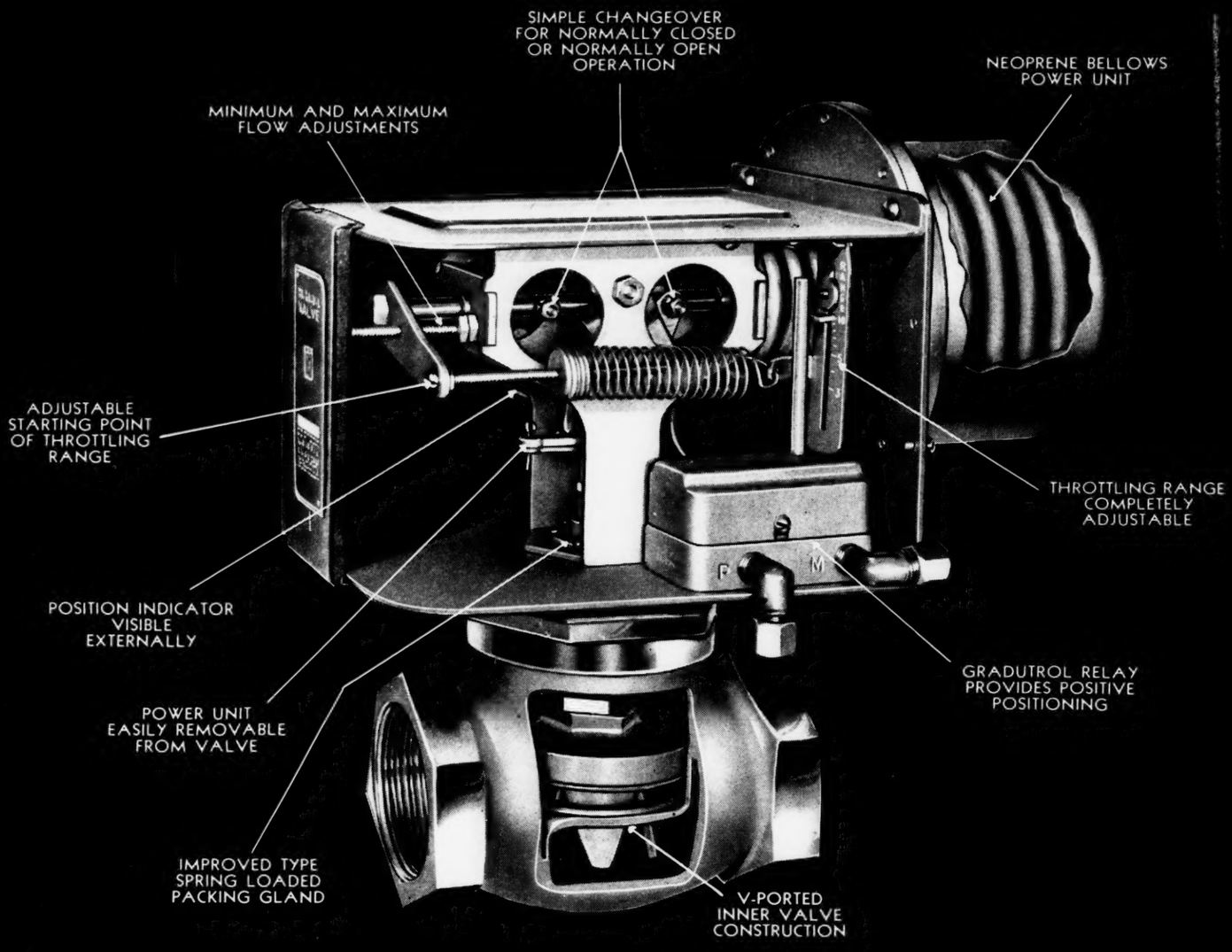
The practice of taking cold air from the floor has the effect of checking the natural upward rise of the heated air and of holding it more nearly horizontal until its heat is spent, when it joins the air returning to the fans. In this way, the great volume of the heated air is retained near the working surface, and overheating the top portion of the building is avoided.

The overall floor space taken up by the units is unusually low. The heater output per square foot of floor area is 33,000 B.t.u. per hour. The heaters are of heavy welded steel construction and are provided with a fan capacity of 12,000 c.f.m. referred to intake conditions. A power type multiple jet gas burner is used and is provided with automatic controls that act to shut off the gas in the event of flame and power failure. The heaters are of the blow-through type, thus assuring freedom from flue gas contamination in the air stream in the event of a localized failure in the heating surface.

The Outlook

SCHNITMAN PREDICTS BUILDING PROSPECTS FOR 1941;

ARMY AND NAVY CONSTRUCTION CHIEFS VIEW DEFENSE WORK.


SIMPLE CHANGEOVER FOR NORMALLY CLOSED OR NORMALLY OPEN OPERATION
NEOPRENE BELLOWS POWER UNIT
MINIMUM AND MAXIMUM FLOW ADJUSTMENTS
ADJUSTABLE STARTING POINT OF THROTTLING RANGE
THROTTLING RANGE COMPLETELY ADJUSTABLE
POSITION INDICATOR VISIBLE EXTERNALLY
GRADUTROL RELAY PROVIDES POSITIVE POSITIONING
POWER UNIT EASILY REMOVABLE FROM VALVE
IMPROVED TYPE SPRING LOADED PACKING GLAND
V-PORTED INNER VALVE CONSTRUCTION

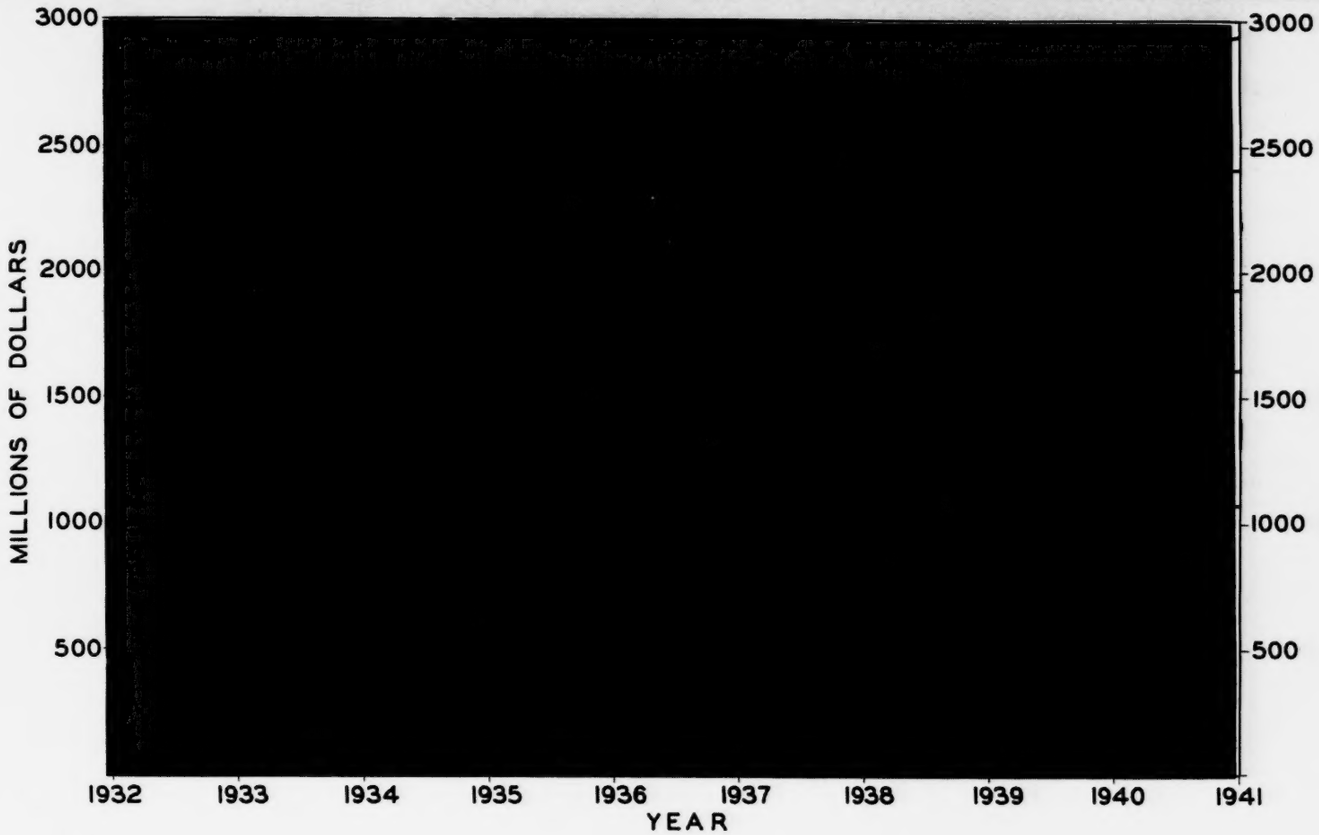
Play Safe!

NEW

GRADUTROL COIL VALVE

MINNEAPOLIS-HONEYWELL

CONTROL *Systems*

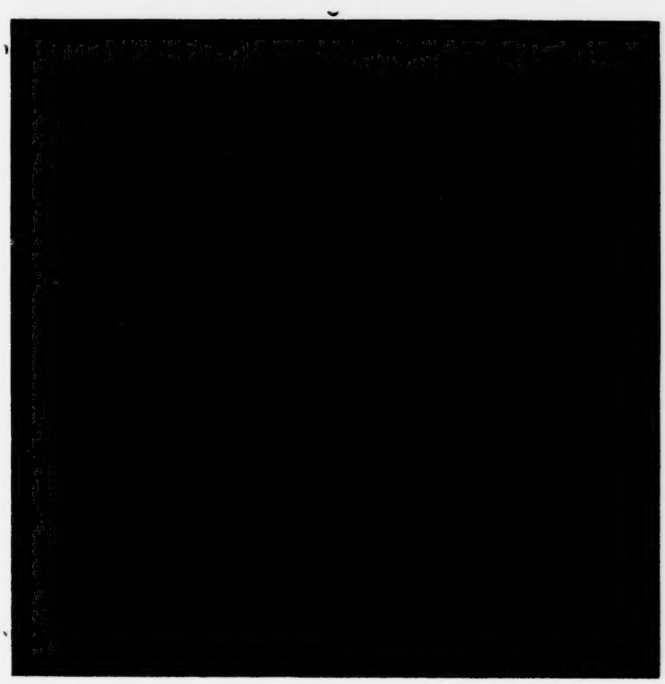


Classification of urban new building extending over 37 states for years 1932 to 1941. 1941 figures are the author's prediction.

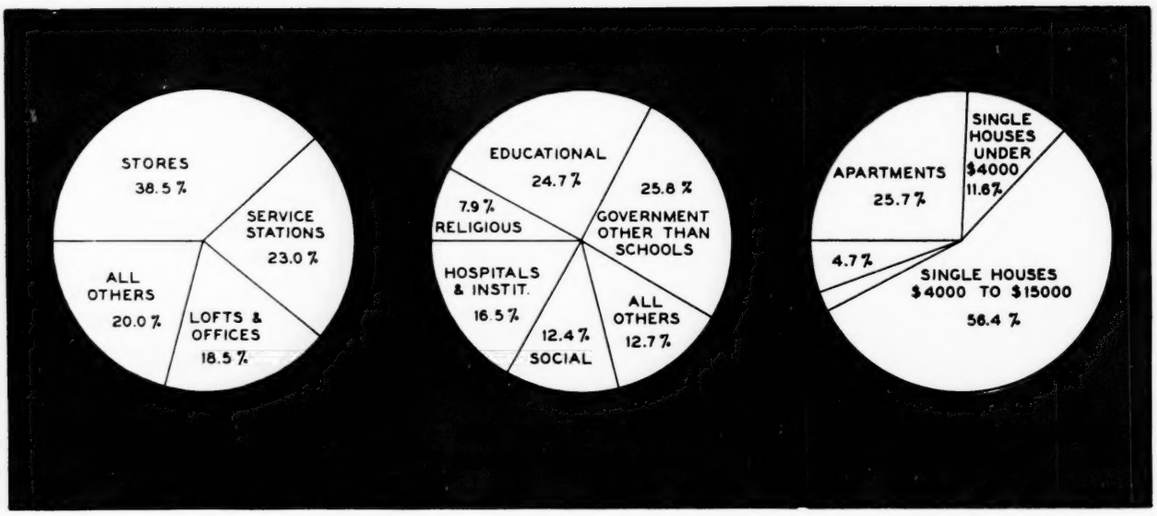
L. SETH SCHNITMAN looks at

BUILDING PROSPECTS FOR '41

TOWERING above all else on the 1941 building and construction horizons are the far-flung ramifications of the National Defense Program, only now beginning to show visible evidences of progress. On this consideration alone, one excusably could be justified in quickly concluding that structures and facilities of most every description will be reared in 1941 in a volume not seen since the dizzy heights of the middle and latter 1920s. Indeed such may happen; but to this observer of the current scene there is just enough in the picture to call for a somewhat subdued optimism, taking the year 1941 as a whole.



The construction industry has just rounded out seven years of practically uninterrupted recovery since the depression pit of 1933. In this fact, empiric though its interpretation may be, lies a hurdle of transcendent significance. If taken in stride, it will mark the first time in the long history of construction statistics that, of a given construction cycle, the rising phase of which usually consumes about 11 years, a temporary puncture has not occurred after the seventh year of advance. Were there no other considerations, defense or no defense, this tell-tale historical fact must stand as the backdrop without which no well-ordered appraisal of the 1941 building scene can be made. The more so now, because the incidences of the Defense Program in the latter half of 1940 were already so dispersed as to have afforded gains for 1940 as a whole over 1939 of about 11% in all construction and of about 25% in building only (excluding civil engineering projects for



purposes of this article), when on truly more fundamental factors than inhere in the ephemeral considerations of defense, the year 1940, taken in prospect, itself had many of the earmarks of being an off-year in building.

What then is the 1941 building outlook? On the F. W. Dodge Corporation basis of coverage of the 37 Eastern States, about the best one conservatively may look for is a building total (exclusive of heavy civil engineering projects, such as roads, bridges, dams, public utilities and the like) that will be no more than 4% greater than the 1940 volume. For the 37 Eastern States, this would mean a combined volume of residential and nonresidential buildings, both new and alterations, of not in excess of $2,935,000,000 to be reported during 1941 by the F. W. Dodge Corporation as contrasted with the comparable figure of $2,840,000,000 for 1940. To these estimates must be added about $615,000,000 and about $580,000,000, respectively, for 1941 and 1940 for the probable building volume in the 11 Western States (estimated on the basis of building permits to provide a coverage equivalent to that for the 37 Eastern States, but unreported on by the Dodge agency) to give a rounded picture for the United States as a whole, though even such additions would take no account of expenditures for diverse building projects of low unit-values, both new and alteration, which escape periodic recordation by the F. W. Dodge Corporation.

Now, any volume of building that, on the basis already indicated, promises to run for 1941 not far from $3,550,000,000, cannot be dismissed lightly, coming as it may upon a succession of seven years of earlier gains. Be that as it may, for considerations to be discussed a bit further on, even despite further releases for building operations still to be made in furtherance of our Defense Program, it would appear more prudent to count only on a 1941 United States building volume (equivalent Dodge basis of coverage) no greater than the very creditable total of about $3,420,000,000 turned in during 1940, itself, incidentally, the largest building figure since that for 1930.

Because of the relative ease in checking 1941 progress against the forecasted volume, all further references herein to the building prospects, unless otherwise specified, henceforth will be confined to the 37 Eastern States. How then does the building total for 1941 of $2,935,000,000, on this basis, look on a breakdown? At best it means about $1,600,000,000 for residential building of all types, private and public, in the 37 Eastern States, this as contrasted with a 1940 total of $1,565,000,000. Thus a gain of no more than 2% is indicated over the 1940 residential volume, itself the highest since that for 1929.

For nonresidential building types of every description, public and private, the 1941 outlook is for a total of no more than $60,000,000 in excess of the 1940 figure of about $1,275,000,000. If realized, the indicated total of $1,335,000,000 would provide a gain over the 1940 total of about 5%, but would still be almost 30% below the comparable figure for 1930.

To avoid later disappointment, it is well to stress these prospects of only modest gains at best, for both residential and nonresidential building. Especially is this so, because of recent interpretations in some quarters, of the incidences of the Defense Program on 1941 building, which have brought forward forecasts of much greater gains than those here indicated. Though actual expenditures for building operations are yet to peak, by far the larger proportion of foreseeable requirements for *new space*, both residential and nonresidential, to further our defense needs, has already found reflection in the building figures, measuring as they do the volume of *contracts let or work started* and not progress of actual building operations. What yet remains, will likely all be reflected in the building records in the initial six months of 1941, unless of course the Defense Program should take on even greater stature, for whatever reasons.

In the meantime, we are ready now to detail further the estimated figures for both residential and nonresidential building. Of the 1941 residential estimate of $1,600,000,000, about $1,080,000,000 is the probable ceiling for one-family houses in the 37 Eastern States, this, a bit off from the comparable figure for 1940. For apartment buildings, hotels and dormitories, the 1941 figure in the amount of about $335,000,000 will, likewise, evidence no significant change from the comparable figure for 1940. Neither will two-family houses,

with an estimated 1941 volume of not in excess of $50,000,000, show any material deviation from 1940 performance. It seems, then, to remain only for other forms of shelter, which include barracks, tourist cabins and all other classes of unspecified housing largely of low unit-values, in a combined estimated 1941 volume of about $135,000,000, at best, to provide the source, if any there truly be, for the already indicated overall modest gain for the total of all classes of residential building in 1941.

Breaking down the 1941 estimate for nonresidential building there are rather sharp contrasts to be noted, especially as between commercial and manufacturing buildings, on the one hand, and public and so-called institutional buildings, on the other. Of the forecasted nonresidential volume of $1,335,000,000 in the 37 Eastern States, commercial building may likely attain a volume of about $325,000,000, for an increase of about 3% over its 1940 total. Even so, such would be only little better than the 1931 figure and less than 55% of the 1930 figure. Nor could much more be expected with vacancy ratios in office space still being relatively high and occupancy ratios in commercial warehouses still relatively low, for it is in these two types of commercial building operations that customarily about half of all commercial building occurs.

For manufacturing buildings the volume to be undertaken in 1941 will likely amount to about $525,000,000, for an increase of approximately 15% over its respective 1940 figure. Building gains will doubtless center more largely in the mechanical industries than in the processing branches of industry, for it is in the former where the defense needs are the most urgent and where suitable space is least available. Requirements for additional capacity in the aviation, shipbuilding and more lately the steel industry, may be said to still hold the spotlight insofar as the 1941 outlook for manufacturing buildings is concerned. And here is as good a place as any to indicate that as to manufacturing building requirements the cited figures take no account of the appurtenant needs for machinery and equipment which bulk ever so much larger than the demands for their *housing*. And it may also be noted here that what yet remains of the space requirements for defense needs as to make itself felt in the figures on nonresidential building as a whole, will, in large measure, be concentrated in commercial and industrial building, more particularly the latter.

Estimated change of volume of expenditures for new buildings of various types in 1941 as compared with 1939.

Viewing the prospects for public and institutional buildings, 1941 promises to show a decline from 1940, moderate though it may be. At best, these types will likely show a volume of no more than $485,000,000 in the 37 Eastern States, this as contrasted with a realized total for 1940 in the neighborhood of $500,000,000. The reasons for decline are not hard to find; chiefly they grow out of an almost certain curtailment in all types of public building, both Federal and non-Federal, not needed for the direct purposes of defense. The classes to suffer most from such retrenchment are educational buildings and public administrative buildings, such as post offices, office buildings, Capitols, jails and penitentiaries to an extent that will bulk larger than the combined gains which appear indicated as to military and naval buildings, such as armories, arsenals and the like. Though modest gains appear possible for hospitals these seem destined to be about offset by declines in religious buildings and in social and recreational structures.

How do the 1941 building prospects shape up geographically? As may be gathered from the tables below, something of a photo-finish is indicated for the 1941 building race, with about $730,000,000 representing the neck-and-neck total for each of two major geographic areas, viz., the Middle Atlantic and the East North Central States, followed rather closely by the South Atlantic States, with an indicated probable volume of about $595,000,000 covering both residential and nonresidential building. Of the remaining major districts embraced in the 37 Eastern States, fourth place seems secure for the West South Central States, with an indicated volume of $290,000,000, trailed by the New England States with a total of $235,000,000, by the West North Central States with about $205,000,000 and the East South Central States with a volume of $150,000,000. Excepting only the East and the West North Central States a building gain appears probable for each major area in 1941 as compared with 1940. And this is the case, too, if one include the 11 Mountain and Pacific Coast States, for which, together, the 1941 building volume may likely reach the combined total of $615,000,000.

In arriving at these territorial figures approximations of the income by districts took first importance. Of almost equal importance were the territorial approximations of the incidences of the Defense Program. In addition, such elements as vacancy conditions in commercial space and industrial buildings, general industrial and agricultural conditions, and other purely local considerations especially applicable to nonresidential building prospects, were assigned reasonable weightings.

As to residential building, such added items as rents, housing shortages, defense housing needs and the like were given due consideration. As to both residential and nonresidential building the factor of building costs was given a weighting second only to the Defense factor.

RESIDENTIAL BUILDING IN THE UNITED STATES BY GEOGRAPHIC DISTRICTS

MILLIONS OF DOLLARS (COMPUTED ON BASIS AND METHODS OF F. W. DODGE CORPORATION COVERAGE)

GEOGRAPHIC DISTRICT	1941 FORECAST	1940 PRELIMINARY	1939
New England	$120	$105	$82
Middle Atlantic	385	390	435
East North Central	405	420	318
West North Central	110	115	102
South Atlantic	350	330	227
East South Central	85	70	50
West South Central	145	135	120
37 Eastern States	$1,600	$1,565	$1,334
Mountain**	40	40	35
Pacific**	310	280	235
TOTAL UNITED STATES	$1,950	$1,885	$1,604

**Figures for Mountain and Pacific Coast States are estimated on the basis of reported building permits of the U. S. Department of Labor with adjustments to give effect to the comparable reporting contract basis employed by F. W. Dodge Corporation in the 37 Eastern States. Data include alterations and additions just as do the Dodge figures.

NONRESIDENTIAL BUILDING IN THE UNITED STATES, EXCLUDING CIVIL ENGINEERING, BY GEOGRAPHIC DISTRICTS

MILLIONS OF DOLLARS (COMPUTED ON BASIS AND METHODS OF F. W. DODGE CORPORATION COVERAGE)

GEOGRAPHIC DISTRICT	1941 FORECAST	1940 PRELIMINARY	1939
New England	$115	$105	$68
Middle Atlantic	345	325	268
East North Central	325	320	221
West North Central	95	95	92
South Atlantic	245	235	181
East South Central	65	60	42
West South Central	145	135	93
37 Eastern States	$1,335	$1,275	$965
Mountain**	35	35	30
Pacific**	230	225	140
TOTAL UNITED STATES	$1,600	$1,535	$1,135

**Figures for Mountain and Pacific Coast States are estimated on the basis of reported building permits of the U. S. Department of Labor with adjustments to give effect to the comparable reporting contract basis employed by F. W. Dodge Corporation in the 37 Eastern States. Data include alterations and additions just as do the Dodge figures.

And what about building costs? On an earlier occasion in the current recovery movement in building, more particularly in 1937, too rapidly mounting building costs temporarily operated to arrest the forward surge in building activity. Now again this specter appears as a menacing factor for 1941, in part due to recent rises in building material prices, most significantly for lumber, in part because of some upping in the rates of pay for building labor, both skilled and unskilled, in part because of the shortening of the work week in certain localities as applicable to the building industry, in part because of growing shortages of skilled building craftsmen especially in key defense areas. Whatever the reasons, the end result now is a level of building costs that as 1940 ended was not only some 10% above the level a year earlier, but worse, was within striking distance of the all-time high recorded in the latter 1920s. Despite the efforts of the Advisory Commission on National Defense and those of the U. S. Department of Justice to curb runaway building costs further rises loom for early 1941. Coming at a time of rapidly approaching cyclical maturity for building generally and especially now when historical precedent alone would call for a temporary halt in the recovery movement anyway, a further rise in building costs of as little as 5% would likely be all that is necessary to tip the balance and make building, which now seems scheduled to ignore precedent, conform to long-standing pattern. This seems the clearer since building costs are rising more rapidly than are residential rentals and even family incomes, for, it is on residential building that the job of generating the cycle still largely devolves.

That residential rental rates are now rising is a mixed blessing for besides improving the lot of real estate, in an ever-growing number of defense areas especially, where rents have moved up rather spectacularly, clamor for reviving rent-control legislation of a score and more years back is becoming more audible. Put a ceiling over rents, as was true in many municipalities in the latter days of the First World War and the early years of the reconstruction period, and presently the flow of investment money into rental housing, in the face of mounting building costs, will be diverted. Then the main prop of the building industry, viz., residential building, will have been undermined, Defense Program notwithstanding and irrespective of the going most liberal mortgage finance terms in history under the plan of the Federal Housing Administration. If government, industry and labor can resolve these problems quickly —problems of building costs, residential rentals and the implications inherent in the maturing building cycle— there still are the problems of labor strife, both within and without its own fold, and the uncertainties of the size and onus of the tax load, now made so much more pressing by the demands for defense. That these be resolved early in 1941 is necessary to insure continued gains in building. More, this is essential, to negative currently accumulating evidences that the present cycle, when it will have completely run its upward course, will have proved to be a dwarfed one by contrast with the last cycle, some significant figures for which are given in the table below:

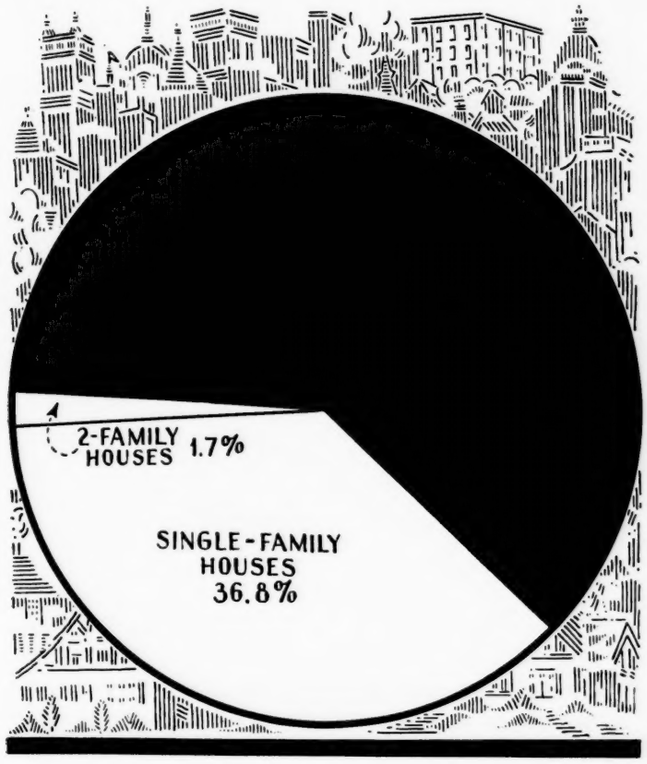
BUILDING IN THE 37 EASTERN STATES
(Excluding civil engineering)*

MILLIONS OF DOLLARS

	RESIDENTIAL BUILDING	NONRESIDENTIAL BUILDING	TOTAL BUILDING
1925	$2,748	$2,202	$4,950
1926	2,671	2,418	5,089
1927	2,573	2,439	5,012
1928	2,788	2,438	5,226
1929	1,920	2,425	4,345
1941**	1,600	1,335	2,935

*Figures of F. W. Dodge Corporation
**Forecast by author

Looking ahead, where are the increments to come from to give overall building totals reminiscent of those



How new building in 1941 will be divided among the major building classifications. Note that the bulk of expenditures will be for types other than houses.

of 12 to 15 years ago? Hardly from apartment buildings, hotels and dormitories, which, except in isolated instances, are still suffering from the speculative excesses of yestercycle, during the heyday of which these structural types accounted for better than 26% of all building, exclusive of engineering. To point this up further, contrast need only be made between the 1941 estimate of $335,000,000 for apartments, hotels, and dormitories and the corresponding figures for any of the peak residential building years, viz., 1925 to 1928, inclusive, ranging as they did, between $1,343,000,000 and $1,469,000,000. Where else may one look?

To commercial building—stores, bank buildings, office buildings, commercial warehouses, garages and service stations, which in the peak years of the previous cycle accounted for more than 18% of all building, exclusive of engineering? Hardly, for the estimated 1941 total of $325,000,000, having adequately allowed for gains to flow from increasing commercial activity generally and from an appreciable quickening in the national income, is still in sharp contrast with an annual range of between $872,000,000 and $933,000,000 for the best commercial building years of the 1920s, viz., 1925 to 1929, inclusive.

Defense needs considered, what do we find as to manufacturing buildings? The 1941 estimate of $525,000,000 *exceeds* the realized volumes for any of the industrially prosperous years, 1925-1928; and is within about $20,000,000 of our best year in the history of manufacturing building statistics, viz., the year 1929. For the five-year period, 1925-1929, inclusive, manufacturing building accounted for only 9% of all building operations in the 37 Eastern States, exclusive of engineering construction as previously defined; and in the best year for manufacturing building, 1929, for but 12½% of that year's total building which, incidentally, had registered an overall decline of 17% from its corresponding volume for 1928.

In the peak building years of the 1920s, apartment buildings, hotels, dormitories, commercial buildings and manufacturing buildings, together accounted for virtually 55% of all building. This represented the flow of private capital into investment and even speculative enterprise. For 1941, these building types, on the basis of estimates already shown, will account for but about 40% of the estimated volume of all building. And this spread between the ratios of today and yestercycle may be taken to reflect the approximate measure of timidity on the part of venturesome capital, all current uncertainties considered, running the gamut of those already mentioned and even including such possibilities as our embroilment in the war as an active belligerent; a nearby peace; or the defeat of England.

Since residential building as a whole holds such a dominant role on the building stage we may now revert to its consideration, this time in terms of dwelling units. As may be seen from the following estimates covering the 37 Eastern States the 1941 total of about 287,000 units calls for a decline from the comparable figure of about 295,000 for 1940, this chiefly to give reflection to the effects of rising building costs.

Of the 206,000 one-family houses estimated to be constructed in 1941 in the 37 Eastern States (Dodge basis of coverage), about 17% will have a unit building cost, exclusive of land, under $4,000, while the remainder will involve building expenditures of $4,000 and more per project.

If one were to look at the overall probabilities for the United States as a whole, which would include allowances for residential building of low unit-values not customarily reported on by F. W. Dodge Corporation even in the 37 Eastern States on any complete basis, there is a likelihood that in 1941 some 525,000 dwelling units may be constructed, this as contrasted with about 550,000 for 1940, which, though larger than for any of the recovery years contrasts sharply with the 1925 peak of 937,000 units.

Altogether then, though the building picture for 1941 must still be viewed with relative optimism, this of all occasions is no time to be carried away by boom psychology that is rapidly generating in other segments of the economic structure for reasons that are too closely wedded to unexampled expenditures for needed national defense, which somehow must yet be paid for.

DWELLING UNITS TO BE PROVIDED
(PUBLIC AND PRIVATE)

	1941	1940
In Apartment Buildings	76,000	79,000
In 1-family houses:		
For Owner Occupancy	86,000	88,000
For Sale or Rent	120,000	124,000
In Two-family houses	14,000	15,000
Total Number	296,000	306,000

EXPLAINED BY **REAR ADMIRAL BEN MOREELL**
CHIEF, BUREAU OF YARDS AND DOCKS, UNITED STATES NAVY

EXPENDITURES for public works construction incident to the Navy's shore expansion program set an all-time high in 1940 but will be dwarfed by those of 1941.

The Bureau of Yards and Docks, which directs all shore construction projects for the Navy, administered a construction budget of $156,849,584 during 1940 and has available for 1941 funds totaling $362,170,050. The Bureau's previous peak was reached in 1918, when $89,092,725 was expended. Maximum previous expenditures during any fiscal year since the World War were in 1934, when the total reached $16,694,000.

While funds administered through the Bureau of Yards and Docks cover airport construction, ship building facilities and countless activities in which heating services and equipment are not involved, nearly all of these projects require a certain number of buildings for housing, administrative or construction purposes.

Among the larger single classifications involving heating are the $56,882,500 projects authorized by Congress under Public Acts 781 and 671 to house married and civilian personnel near Navy Yards, training camps, ammunition plants, airports and shipyards.

In connection with current and prospective expansion of the Navy afloat and in the air, it must be borne in mind that those forces will not be able to operate with their full effectiveness unless they are supported by adequate and properly equipped shore establishments. Shore structures to train and hospitalize personnel, to store equipment and supplies for the Fleet, to build and overhaul ships and aircraft, to house personnel engaged in operating aircraft and the smaller types of ships, to store and manufacture ammunition, and for the multitude of other purposes are all necessary in the operation of a highly mechanized modern Navy and air force.

During the past year plans were developed for 14 new shore stations, and drawings and specifications were prepared for various public works and utilities totaling in value more than three times the all-time high for a corresponding period. The need for rapid action was met by increasing the designing staffs in the Bureau and in field offices and by employing established outside architectural and engineering organizations.

Plans and specifications were standardized as much as possible to permit duplication and regular commercial grades of materials and building practices were used wherever possible.

All major projects for which appropriations are available have been announced; contracts have been awarded for nearly all construction authorized and in scores of instances the work is nearing completion.

Following is a list of some Naval defense housing projects for which contracts have been let or are under negotiation:

Location	Defense Activity	No. of Family Units
Honolulu, T. H.	Naval Station	1300
Kodiak, Alaska	Naval Air Station	250
San Juan, P. R.	Naval Air Station	400
Corpus Christi, Texas	Naval Air Station	750
Guantanamo, Cuba.	Naval Station	200
Alameda, Calif.	Naval Air Station	600
Quonset Point, R. I.	Naval Air Station	238
Newport News, Va.	Shipbuilding and DD Co.	1250
San Diego, Calif.	N. O. B.	1200
Long Beach, Calif.	Naval Activities	400
Norfolk, Va.	N. O. B.	1042
Portsmouth, Va.	NYD and N. A. D.	250
Charleston, S. C.	NYD	200
Indian Head, Md.	Naval Powder Factory	350
Great Lakes, Ill.	N. T. S.	200
Newport, R. I.	N. T. S.	600
Mare Island, Calif.	NYD	250
South Charleston, W. Va.	Naval Ordnance Plant	450
Washington, D. C.	NYD & N.A.S.	600
Orange, Texas	Consolidated Steel	500
Pascagoula, Miss.	Ingalls Shipbuilding Co.	700
Canal Zone		1400
Portsmouth N. H.	Navy Yard	600
Vallejo, Calif.	NYD Mare Island	600
Alexandria, Va.	N.T.P.	300
Scattered	18 Projects	1405
	Total	16,035

EXPLAINED BY GENERAL EDMUND B. GREGORY
THE QUARTERMASTER GENERAL, UNITED STATES ARMY

WITH $700 million of its $850 million troop housing and plant facilities fund committed to announced projects and $120 million already paid out for completed work, the Quartermaster Corps enters 1941 with its Construction Division headed by Lt. Colonel Brehon B. Somervell, pledged to the most extensive program in its history.

Of the $120 million paid out, $95 million is for troop housing and expenses related thereto and $25 million is for plant facilities. With a few exceptions most of the remaining troop housing projects, consisting mainly of cantonment and "tent city" construction, are scheduled for completion by March 15.

A $45,700,000 program of defense housing for civilian workers and families of enlisted personnel, is progressing rapidly. Sixty-eight projects were designated by December 20; 18 were under contract on that date and it is hoped to have all contracts awarded by February 1. This phase of the Defense Program is not being prosecuted by the Office of the Quartermaster General, but has been turned over to the Public Building Administration.

The Army's plant facilities program, getting under way rapidly toward the end of the year, involves the construction of powder plants and loading plants, tank factories, and plants for the construction of heavy armament and ammunition components.

Typical of these are the Indiana Ordnance Works, Charleston, Indiana, being constructed by E. I. DuPont de Nemours & Company on a $24,600,000 cost-plus-a-fixed fee basis; the $20,000,000 Chrysler tank plant, Macomb County, Mich.; the $11,564,500 shell loading plant at Ravenna, Ohio; the $10,863,000 Kankakee Ordnance Works at Wilmington, Ill.; the $11,564,500 Elwood Ordnance plant also at Wilmington; the $11,857,000 Baytown Ordnance Works at Baytown, Texas, and many others.

Some $150,000,000 of the Army's construction fund is not yet committed. Practically all troop housing needed for the authorized forces of 1,400,000 has been contracted for, however, and unless there is need for an early increase in the number of men required, it is unlikely that further projects of this nature will be designated in 1941.

Plant facilities contracts, on the other hand, are being cleared daily through the National Defense Advisory Commission and with the appointment of the new four-man board it may be anticipated that the Army's remaining plant facility funds will be allocated in short order.

Besides the plant facilities being financed with Army funds for operation by private manufacturers, many barracks, hospitals, officers quarters, and other permanent structures are being erected by the Army for use on military reservations.

Typical of heating awards involved in recent contracts are the following: Central Heating Plant, Jeffersonville QM Depot, Jeffersonville, Ind., awarded to C. A. Hooper Company, Madison, Wisconsin, $451,354;

Steam distribution system, Lowry Field, Colo., awarded to Peter Seerie, Denver, $126,588;

Central heating plant, Lowry Field, awarded to Mead and Mount, Denver, $497,758;

Heating plant for Air Corps hangar, Scott Field, Ill., C. J. Moritz Heating Company, St. Louis, $6192;

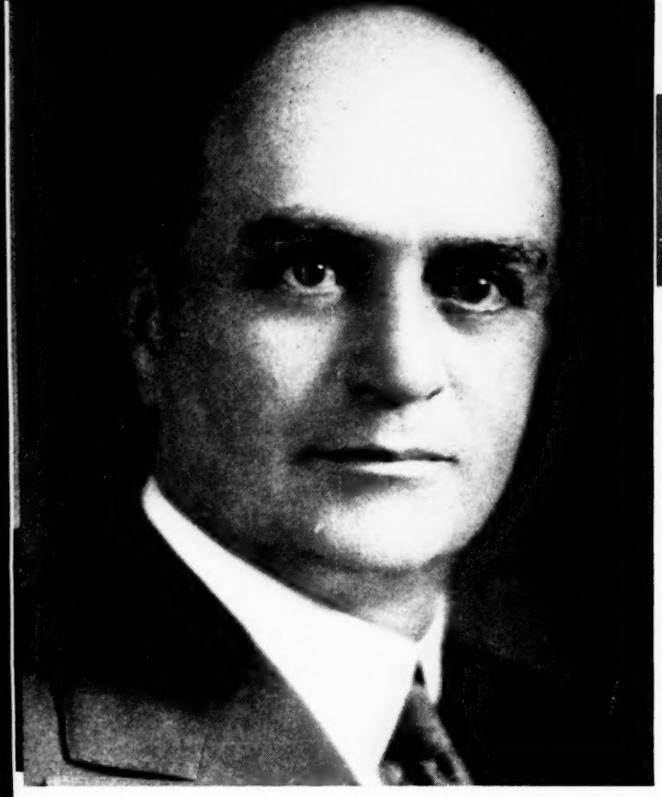
Air conditioning system in control tower, Scott Field, Ill., Natkin and Company, St. Louis, $1125;

Air conditioning in hospital, Scott Field, Ill., Thos. J. Sheehan Company, St. Louis, $5527;

Heating plant, Scott Field, Ill., McDonald Construction Company, St. Louis, $417,840;

Steam distribution system, Westover Field, Mass., Arnold M. Diamond, Brooklyn, $77,478;

Central heating plant, Westover Field, Mass., George A. Bass, Detroit, $404,281.



PRIVATE BUILDING PROSPECTS

EXAMINED BY **ABNER H. FERGUSON**
ADMINISTRATOR, FEDERAL HOUSING ADMINISTRATION

A CLUE to the part the Federal Housing Administration may be expected to play in the accelerated defense housing program during 1941 is contained in recent reports of gains ranging up to 155% in new home construction financed by FHA-insured loans registered in key industrial areas during the last four months.

FHA will be watching loan figures with interest during the next few months to determine whether the gains of the last few months represent a lasting trend or merely a taking up of slack in areas where defense industries are most active.

Not being an originating agency, FHA merely reflects the attitude of private industry and the individual home seeker. The Lanham Act, making available $150,000,000 for defense housing, can take care of some needed projects but private industry must do the major part of the construction job. The extent to which private industry is already participating in the defense housing effort is encouraging.

It is generally admitted that private industry is not particularly interested in temporary housing for defense workers and cannot build at low enough cost for certain classes of workers. In theory it has been hoped that private industry would be able to construct homes required by many workers in the defense areas.

If the problems concerned with investment of private capital are not satisfactorily solved and if the defense program tends to build up specified industrial areas by drawing heavily upon the population of others, there is a possibility that building under the FHA-insured mortgage plan might be reduced in some areas.

Present indications are, however, that this will not be the case, since favorable financial effects of the defense program are already noticeable in areas not directly affected and since emergency housing programs in defense areas are not planned with a view to meeting the needs of the middle and higher income brackets.

In addition to the private industry phase, FHA-insured mortgaging is expected to enter the defense housing picture to an important extent through activities of the newly-formed Defense Homes Corporation, capitalized by the RFC. In areas where private industry does not find such construction feasible, the Defense Homes Corporation will advance the needed equity and FHA will insure the mortgage, funds being derived from the usual private sources.

These projects are expected to demonstrate the feasibility of self-liquidating housing in the rent ranges quoted. If the DHC projects at Jacksonville and Charleston operate favorably, it is anticipated the Defense Homes Corporation, through FHA, will become an increasingly important factor in the 1941 defense housing program.

It is probably too early to make an all-inclusive prediction on home building for the coming year, but from the standpoint of FHA operations the general outlook is bright. I personally believe it is bright for those who build, buy, modernize, rent or invest in better housing.

Basing my predictions on our 1940 record I would like to hazard an opinion—all things being equal—that in the coming year another 200,000 families will be living in new homes built by private capital on FHA terms, and that 600,000 more families will improve their present homes on the FHA monthly payment plan.

But figures, as usual, are misleading. So many millions of loans and so many billions of dollars, it seems to me, give a false impression of FHA's operations. Our objective has been, is and will continue to be to encourage the investors of private capital in soundly designed, soundly built and soundly financed homes.

Our ambition is that more and more of our people shall live in homes they own. This will lead to greater national safety because a nation of home owners will always remain a nation of free and democratic people.

PUBLIC BUILDING PROSPECTS

EXAMINED BY JOHN M. CARMODY
ADMINISTRATOR, FEDERAL WORKS AGENCY

PUBLIC Buildings Administration, charged with administration of the Army's $45,700,000 defense housing program, is currently the most active of the Federal Works Agency branches seeking to convert into shelter the $195,000,000 assigned to FWA for defense housing by the last Congress. The fund includes the Army's share of a $100,000,000 Army-Navy housing appropriation and the $140,000,000 made available under the Lanham Act for defense housing of types not of interest to private industry.

Ninety-eight projects involving 30,117 family units had been approved by December 21, and 34 contracts for a total of 11,305 units had been let. Sixteen of the 34 contracts let provided for payment out of the Army's special fund, seven were from Lanham Act funds and the balance provided for United States Housing Authority financing.

It is expected that the Army's special fund will be entirely committed by February 1, that the Lanham Act funds will be contracted by March 1 and that all designated projects will be completed by August 1.

The part being played by PBA is indicated by the fact that 66 of the 98 projects designated by December 21 have been placed under the jurisdiction of the Public Buildings Administration. In completing its contracts PBA, through the Procurement Division of the U. S. Treasury Department, is introducing a mass purchasing plan of acquiring heating units, kitchen equipment and bathroom fixtures.

Under the plan PBA contracts directly with manufacturers to provide needed equipment in units of 1000, for delivery to contractors at construction sites. The plan is said to be working admirably from the standpoints of manufacturers as well as the Government. Surplus stocks of 1940 models of ranges, refrigerators, heaters and other equipment are being absorbed and it is planned to use mass purchasing methods wherever PBA directs defense housing.

Three initial contracts under the plan provide for purchase of steel bathtubs from the Briggs Manufacturing Co., Detroit, $475,852; steel bathtubs from the Youngstown Press Division, Mullins Manufacturing Corporation, Warren, Ohio, $53,400, and warm air furnaces and accessories from the Williamson Heater Co., Cincinnati, Ohio, $38,885.

While PBA is currently in the spotlight on defense housing, USHA, another Federal Works Agency subsidiary, already has 21 projects under way and has recently been assigned six new ones, as follows: Pensacola, Fla., 100 units; Jacksonville, Fla., 300 units; Boston, Mass., 1050 units; Philadelphia, Pa., 500 units; Charleston, S. C., 600 units; and Bremerton, Wash., 800 units.

With a commendable start made on projects authorized under the Army defense housing plan and the Lanham Act, the next two months should see new speed records established in determining needs, designating sites, securing property, negotiating contracts and in completed construction.

Only those who have actually engaged in the business of site selection and land purchase on a large scale throughout the United States are aware of the problems and the obstacles, but the machinery is in motion and warrants our forecasting the awarding of all contracts by March 1. Housing surveys are now complete with respect to most of the contemplated needs, site negotiations are being speeded to an extent not previously necessary or possible, and with the PBA pattern of construction and mass purchasing established, duplication of contracts and procedure is greatly simplified.

Public Roads Administration, a third FWA unit, specializing in public roads construction, will be active in planning and constructing military highways, but will be little concerned with defense housing projects.

HOW TO GET 1941 DEFENSE BUSINESS

ARMY—CONSTRUCTION DIV.

AGENCY: Construction Division, Office of the Quartermaster General, Washington, D. C., Lieutenant Colonel Brehon B. Somervell, Chief.

FUNCTION: Supervises design and construction of all Army structures, except fortifications.

DEFENSE PROGRAM: Administering $1,000,000,000 fund to expand existing military establishments, establish new troop facilities and air fields and to create or enlarge facilities for the manufacture and storage of material.

HOW CONTRACTS ARE LET: Contracts for construction for use by the Army are let on cost-plus-fixed-fee basis, to general contractors where projects involve general construction; to specialty contractors when the work is largely limited to heating, plumbing, electrical or other utilities.

Contracts for construction of plant facilities needed for private industry producing material for the Army are let in two ways, both on cost-plus-fixed-fee basis. Under certain conditions the Construction Division may either let the contract direct to a general contractor, or may let the contract to the firm supplying material. This firm, in turn, negotiates the actual construction contract in accordance with commercial practice.

WHOM TO CONTACT: Write, requesting consideration on current or future projects, to Construction Division, Office of the Quartermaster General, Washington, D. C. Provide the following information: (1) Experience in fee construction. (2) Experience in competitive bid construction. (3) Organization available. (4) Epuipment available. (5) Financial resources. Statements under (1) and (2) should list types of projects, location and cost.

Plumbing, heating and ventilating contractors located near headquarters of Quartermaster Corps Areas should write to Construction officers in those areas, giving the information listed above.

Sub-contractors should also keep in contact with General Contractors negotiating or eligible for Government contracts, and with material plants known to be government-approved plant expansion.

ARMY—CORPS OF ENGINEERS

AGENCY: Corps of Engineers, Washington, D. C.; Major General Julian L. Schley, Chief.

FUNCTION: Supervises design and construction of fortifications and related projects.

DEFENSE PROGRAM: Sharing in the $1 billion defense expansion program.

HOW CONTRACTS ARE LET: Same as Quartermaster Corps.

WHOM TO CONTACT: Write, requesting consideration on current or future projects, to Fortifications and Construction Section (General Thomas M. Robins, Chief) Corps of Engineers, Washington, D. C., giving same information as required by Quartermaster Corps.

NAVY

AGENCY: Bureau of Yards and Docks, Washington, D. C., Admiral Ben Moreell, Chief.

FUNCTION: Supervises design and construction of all Naval shore establishments.

DEFENSE PROGRAM: Administering half billion dollar program of new construction and expansion of Naval stations, shipyards and training stations, including $44,240,000 program of defense housing for civilian workers and families of enlisted personnel.

HOW CONTRACTS ARE LET: Navy construction is let through negotiated contracts on a cost-plus-fixed-fee basis, to general contractors who have placed on file with the Bureau of Yards and Docks the required information. Sub-contractors may be employed at the discretion of the general contractor. When a project involves heating or ventilating primarily, contracts are negotiated directly with specialty contractors.

WHOM TO CONTACT: Write requesting consideration on current or future projects, to Bureau of Yards and Docks, U. S. Navy, Washington, D. C., answering the five questions required by U. S. Army Quartermaster Corps.

F.W.A.

AGENCY: F.W.A. Public Buildings Administration, Washington, D. C., W. E. Reynolds, Commissioner of Public Buildings.

FUNCTION: Builds departmental and service buildings for the Government.

DEFENSE PROGRAM: Under the Lanham Act FWA is directing construction of approximately $140,000,000 in defense housing for Army and Navy Personnel and civilian workers, through its affiliated agencies, PBA, USHA and WPA. PBA has also been assigned $45,700,000 out of Army funds for construction of defense housing.

HOW CONTRACTS ARE LET: PBA, which is expected to administer the bulk of WPA's housing funds, deals only with general contractors on major construction projects. The need for speed, however, indicates sub-contractors will be greatly needed to complete projects on schedule.

Manufacturers of heating and plumbing equipment are advised of PBA's mass purchasing plan of buying such equipment for delivery to contractors in large quantities at project sites.

WHOM TO CONTACT: Contractors or sub-contractors desiring to have their names added to PBA's list should write, asking for Contractors Confidential Questionnaire, Form J-96, to Walter J. Kackley, Office of Supervising Engineer, Public Buildings Administration, Washington, D. C.

Manufacturers desiring to participate in the mass-purchasing plan should write to George Landik, Jr., Assistant to the Director, Procurement Division, U. S. Treasury Department, Washington, D. C.

U.S.H.A.

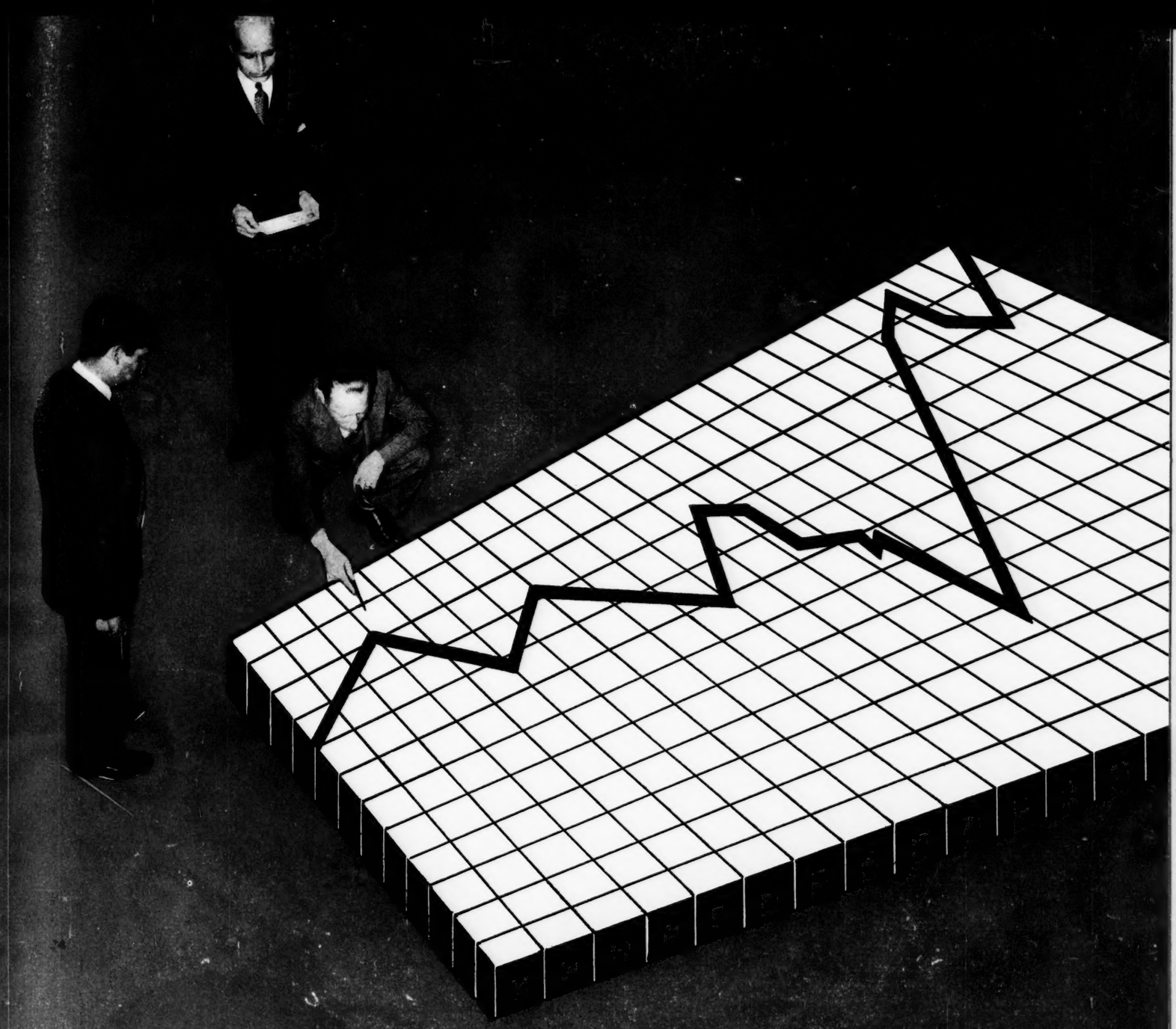
AGENCY: F.W.A., U. S. Housing Authority, Washington, D. C., Nathan Straus, Director.

FUNCTION: Provides construction loans and annual grants for low-rent slum clearance projects developed and operated by local housing authorities.

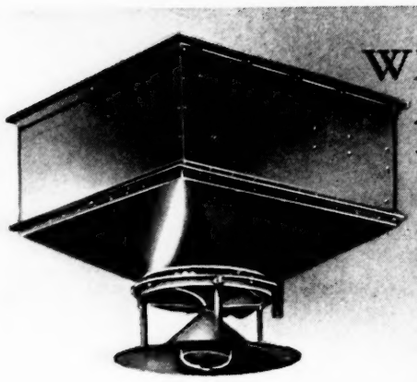
DEFENSE PROGRAM: Had 21 defense projects under way prior to appropriations made available under the Lanham Act and has recently been assigned six additional projects. May be assigned additional projects as allocation of Lanham Act funds proceeds.

HOW CONTRACTS ARE LET: Under present procedure all contracts are let by a local housing authority through competitive bidding.

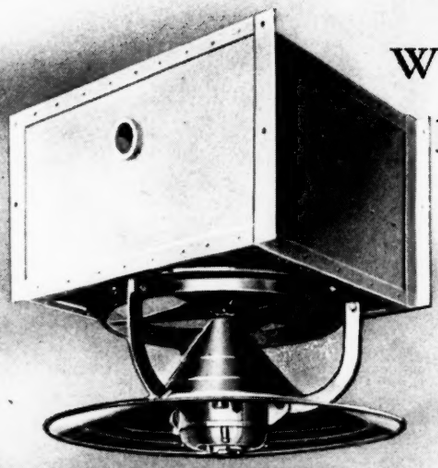
WHOM TO CONTACT: Local Housing Authorities.



THE RE



WING 1921



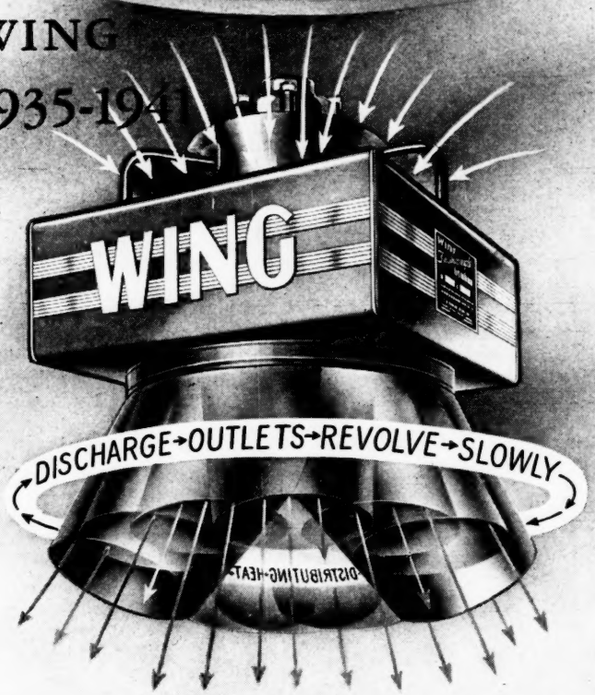
WING 1923

WING 1930

"They copied all they could follow,
But they couldn't copy my mind
And I left 'em sweating and stealing
A year and a half behind."

— *Rudyard Kipling*
The "Mary Gloster"

WING 1935-1941



THE L. J. Wing Mfg. Co. for the past 20 years pioneered and developed the ceiling-suspended, light-weight Unit Heater, projecting the heated air vertically downward to the working level.

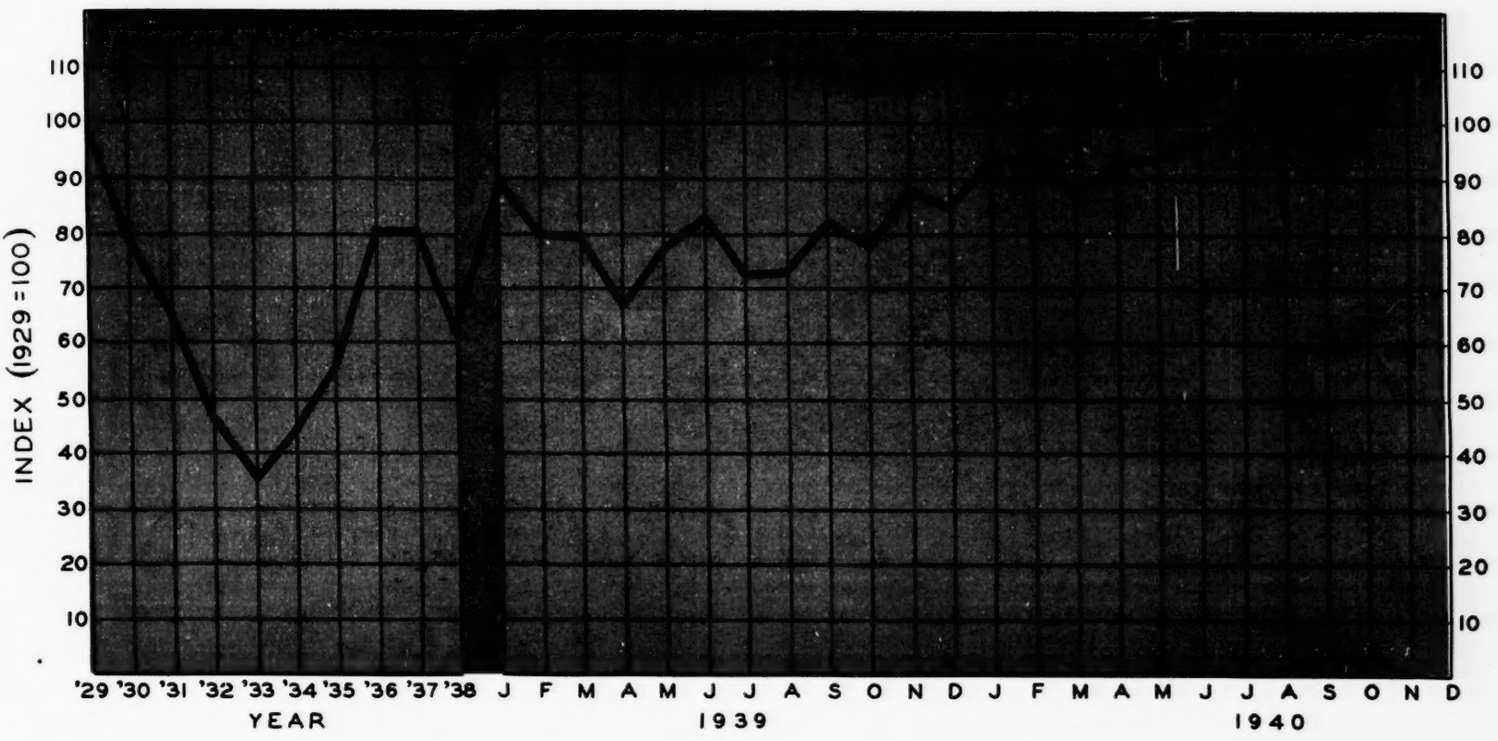
The recent introduction of similar models on the part of other manufacturers is a flattering but belated acknowledgement of the superiority of WING design.

The patented WING Revolving Discharge Unit Heater, now being adopted by progressive architects, engineers and plant operators, is an innovation in heat distribution that further establishes WING leadership.

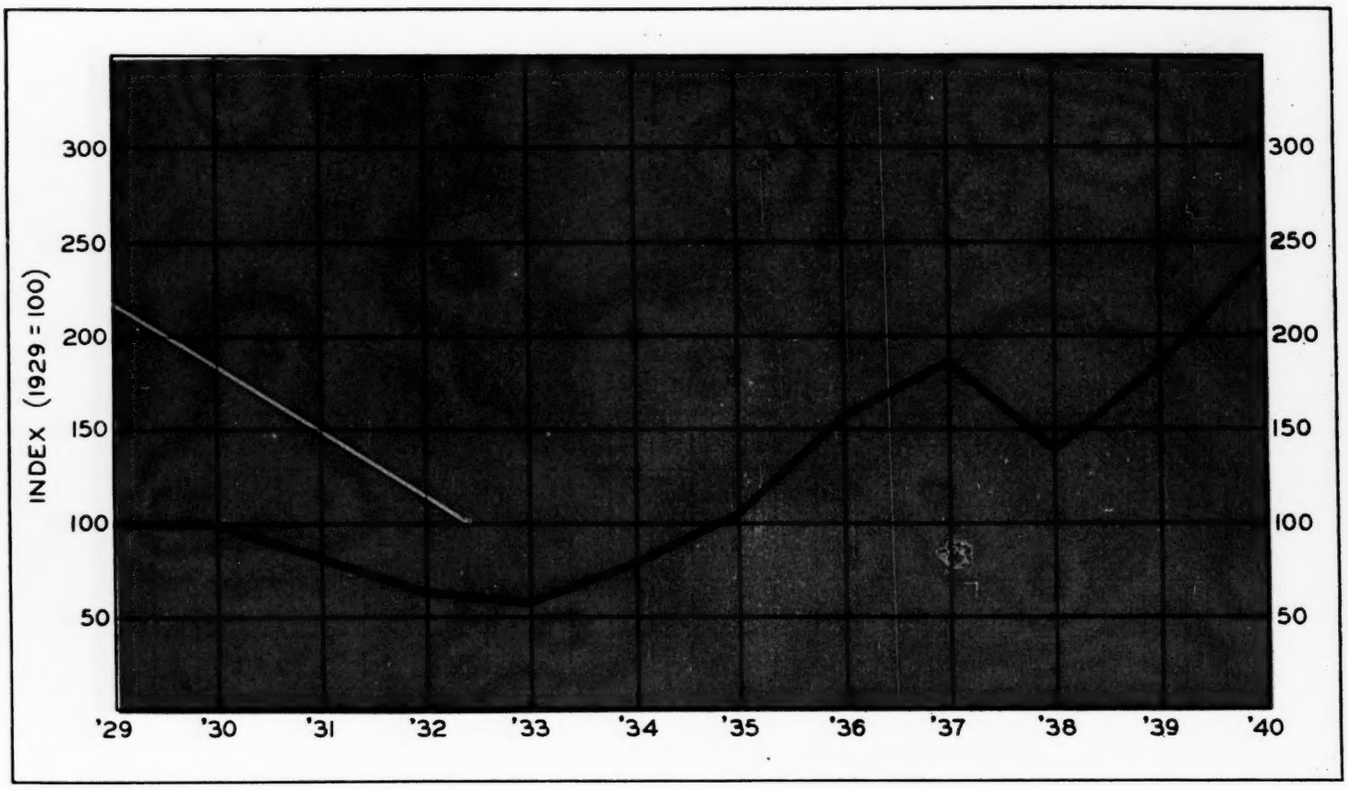
L. J. WING MFG. CO., 158 WEST 14th STREET, NEW YORK, N. Y.

Factory: Newark, N. J. *Specialists in Air Handling Equipment for over 40 Years* **Canadian Factory: Montreal**

Broken—a Ten-year Record!



ONLY 5% below 1929 levels, heating business in 1940 was the best since that year of the market crash. The chart above, a graphical presentation of HEATING & VENTILATING's Index of Heating Business Activity, shows the upward trend of heating business since the spring of 1939. The Index averaged 94.5% of 1929 levels during the first nine months of 1940. The Index which is corrected for seasonal variation, is based on sales of radiators, convectors, square and round cast iron boilers, steel heating boilers, and oil burners. It does not include any component which would indicate the effect of business in warm air furnaces and summer air conditioning due to the lack of monthly statistics on these phases of business. On the other hand, it is a good overall Index of radiator heating and automatic heating. It reflects the physical volume of goods handled, since the bases are in terms of square feet, pounds, or number of units, and does not indicate dollar volume of sales. Consequently, it should be pointed out that although 1940 business was almost at 1929 levels in number of installations and quantities of equipment installed, the year did not approach 1929 in the dollar volume of these installations due to cost and price changes.



AUTOMATIC HEATING

With the number of installations of oil, gas, and stoker fired heating units at an all-time high in 1940, HEATING & VENTILATING's Index of Automatic Heating for the year, based on ten months figures, stands at 244% of 1929. The Index is based on number of units installed and not on the dollar volume of business. Adjusted for seasonal variation, the Index reached a peak of 308 in July.

Sales statistics for the first ten months of 1940 indicate that the year's total oil burner sales will be 250,000 units. Of these 204,000 are conversion burners, 24,000 are furnace-burner units, and 22,000 are boiler-burner units.

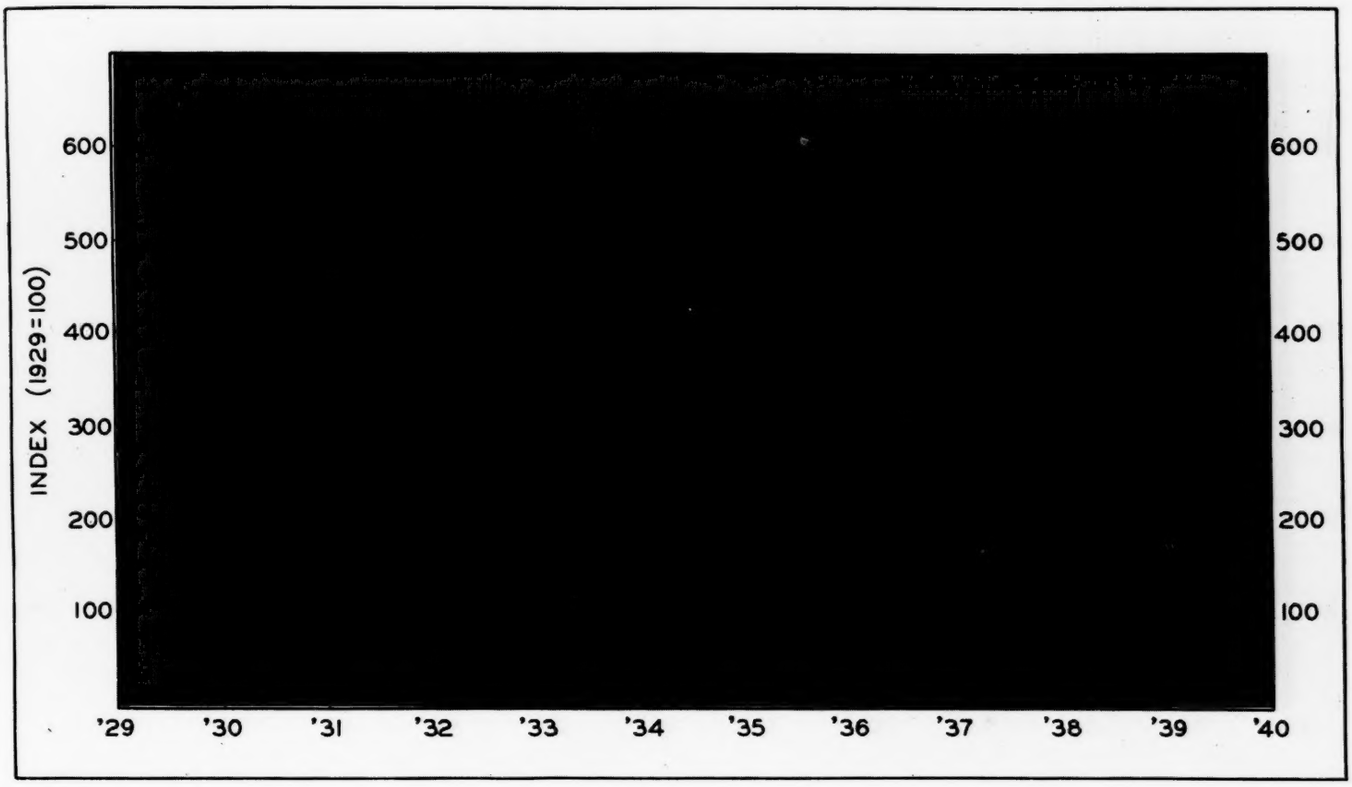
A really striking increase in business is reflected in residential stoker sales figures. Advance estimates indicate sales of 138,000 stokers during 1940, an astonishing total considering the comparative youthfulness of the industry. Of these, 12,300 are anthracite burning stokers, 125,700 bituminous-burning units.

Data are not available for publication on sales of gas boilers or gas conversion burners. Gas furnace sales for 1940, however, totaled an estimated $5,780,000 for the forced air type complete with burner, blower and filter, and $2,120,000 for the gravity type. Coal furnaces of the forced air type had sales of approximately $3,930,000 and oil furnaces of similar design, $5,400,000.

When the vast improvement in residential heating equipment over the past decade is considered in relation to the prevailing low prices, the heating comfort received for a given investment reached an all time peak in 1940.

AUTOMATIC HEAT SALES, 1940
(Estimated)

Conversion oil-burners	204,000
Oil furnace-burner units	24,000
Oil boiler-burner units	22,000
Residential stokers, soft coal	125,700
Residential stokers, anthracite	12,300
Gas furnaces	54,000
Gas boilers	No Data



AIR CONDITIONING

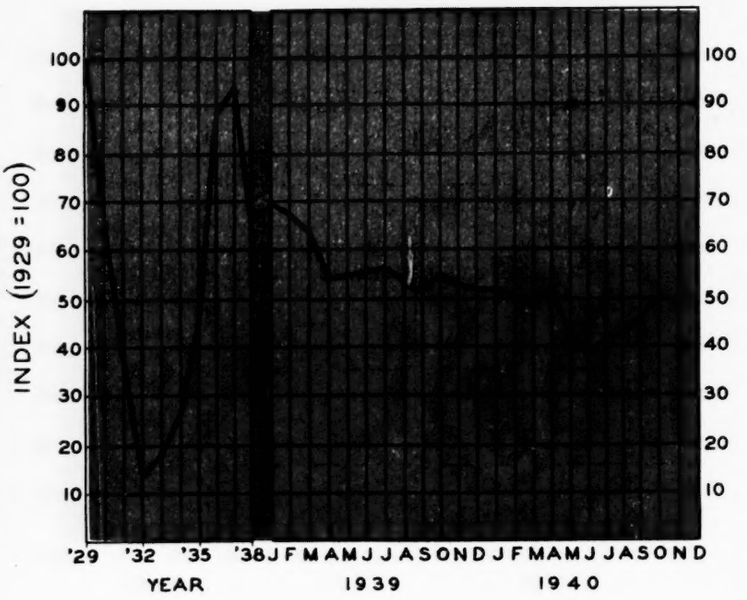
A statistical summary of the progress of summer air conditioning is made doubly difficult this year, due both to the scarcity of data from utility companies and to the sudden cessation of government reports on equipment sales early last spring. However, on the basis of fragmentary data, not to be considered as too reliable, the 1940 installations of summer air conditioning, in terms of value of installation, showed an increase of 36% over those in 1939. Although the graph, above, indicates that the 1937 totals exceeded this, it is probably safe to say that 1940 was the second best year in the industry's history in the conditioning of buildings. From 1934 to 1937, inclusive, the cooling of railroad cars represented a reasonably important part of the bulge in the curve.

Commercial air conditioning—the cooling of stores, restaurants, professional and business offices, and so on—continues to be the backbone of the business, with theater and industrial conditioning totaling fair figures. Residential conditioning has apparently still made little headway; prospects for public building cooling are encouraging for 1941.

Reports from one of the country's largest utilities indicate a breakdown of 1940 installations into size brackets on the basis of number of installations as follows: 0 to 10 hp., 79.5%; 10 to 20 hp., 10.0%; and over 20 hp., 10.5%. On a total horsepower basis, the breakdown is 13.3%, 10.3% and 76.4%, respectively.

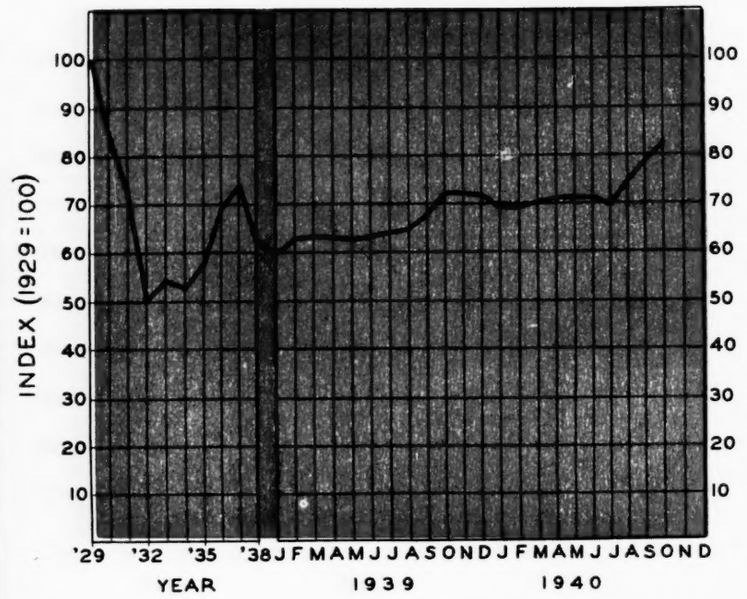
BREAKDOWN OF 1940 SUMMER A.C.
(Estimated)

	Number	Hp.
Commercial	74.2%	77.2%
Industrial	4.9	7.1
Theater	1.8	14.4
Public and Inst.	0.2	0.2
Residential	18.9	1.1
Total	100%	100%



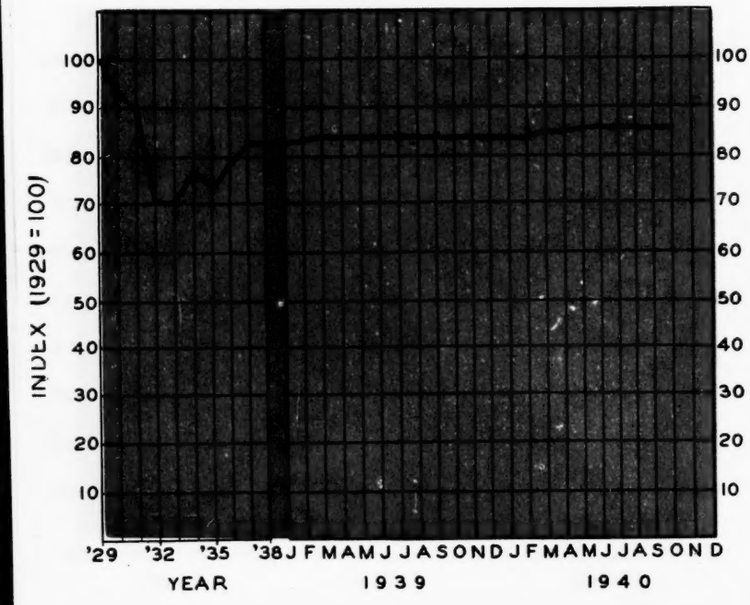
STOCKS

The chart at the left, graphically portraying the trends of HEATING & VENTILATING's Index of Stock Prices, reflects the prices of the common stock of eleven manufacturing companies all or an important part of whose products are for building, heating or air conditioning. Included are companies making boilers and radiators, air conditioning equipment, steam-fittings, stokers, oil burners, unit heaters, controls and insulation. The Index numbers for each month are averages of the relatives, or ratios, of monthly highs and lows to the average monthly highs and lows of 1929, with 1929 = 100. A comparison of the trends of this Index with the Index of Heating Business Activity shows practically no relationship.



EMPLOYMENT

Employment in non-agricultural industries in October was more than a million higher than in October of 1939, with the major gains in manufacturing industries. The chart at the left shows, in index numbers, employment conditions in manufacturing plants making steam and hot water heating apparatus and steam fittings. The index is based on data of the Department of Labor, recomputed to a 1929 = 100 base. Due to changes in the original index of the Department made from time to time, the figures shown here may not be strictly comparable, but they probably do indicate the trends in a broad way.



PRICES

A price index of a commodity or group of commodities is an exceedingly useful tool for the market analyst in enabling him to convert production and sales figures available in physical terms, such as tons and square feet, into dollars, or vice versa, since some commodity and equipment data are reported in physical units, other data in dollars. Unfortunately no one has ever compiled for general use a broad index for heating and air conditioning. Of available indexes, that at the left, a converted Index of the Department of Labor's Index of Wholesale Prices of Plumbing and Heating Materials, in spite of its limitations, is probably the best.

Eighth Annual

NEW EQUIPMENT GUIDE

Suitable for ALL PRESSURES *without change of valve or seat*

Small size . . . Hardly larger than a pipe union . . . a fraction of the size of ordinary traps. ½-inch trap measures 2¼ inches; 2-inch trap, 4¾ inches long.

Light weight . . . Requires no support other than the pipe line, eliminating the bother and cost of complicated brackets and other structures. ½-inch trap weighs only 1⅛ lbs., 2-inch trap weighs 8½ lbs.

Low cost . . . It is frequently cheaper to install a new Yarway trap than to try to repair an old, worn, ordinary trap.

Easily installed . . . Straight line piping, together with small size and light weight of trap, simplifies the installation, makes a neater, better-looking job and leaves clear space around equipment.

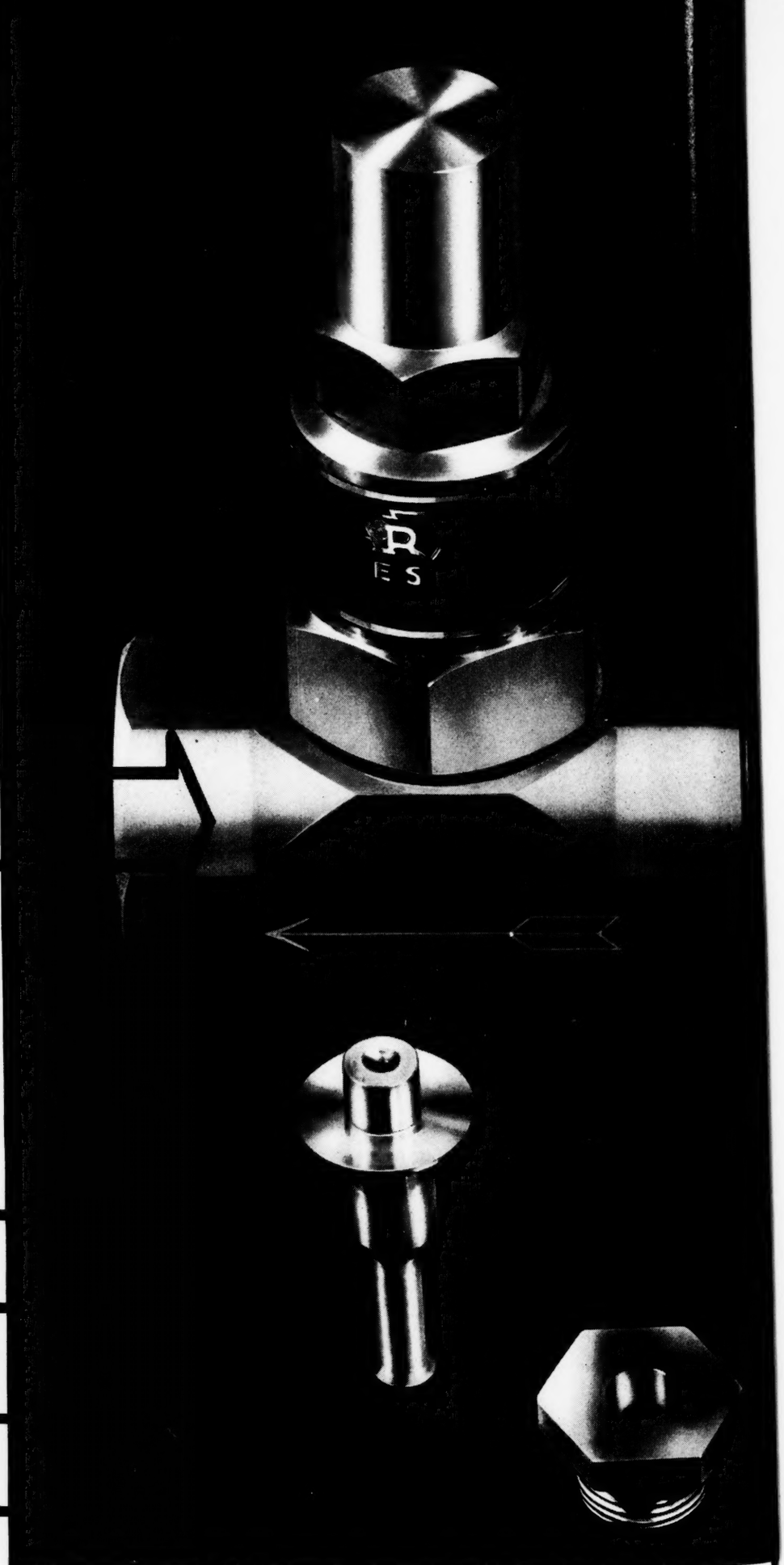
High efficiency . . . Faster heating and greater sustained heating efficiency, because this trap opens wide, discharging large amounts of air and condensate quickly at the start and continuously thereafter. Small size reduces radiation loss to a negligible minimum.

Less maintenance . . . Rugged bar-stock construction throughout. Only one moving part—a simple valve "F". Valve and seat of stainless steel, heat-treated for long life and severe service; body and bonnet of cold drawn steel, bright cadmium plated inside and out for permanent rust-free finish; control cylinder of stainless steel; cap of tobin bronze.

Standardized . . . Six sizes, ½" to 2", serve practically all trap requirements without change of internal parts. Standard construction (described above), for pressures up to 400 lbs., stainless steel trimmed for pressures up to 600 lbs. *Same valve seat for all pressures without change.*

Write for Catalog T-1735, or phone your Mill Supply House.

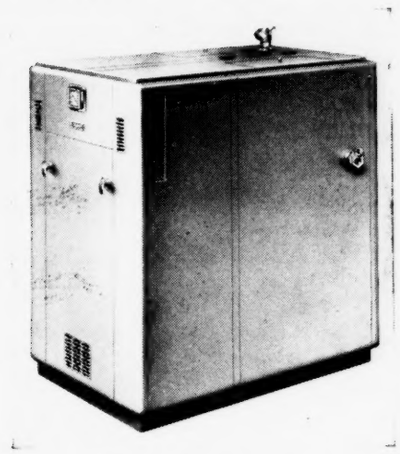
YARNALL-WARING COMPANY
104 Mermaid Ave. Philadelphia



ANOTHER YEAR OF WIDESPREAD POPULARITY

YARWAY IMPULSE STEAM TRAP

HEATING EQUIPMENT



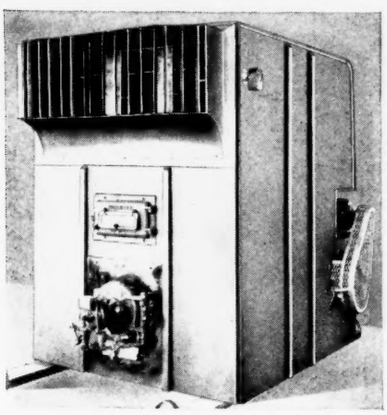
Crane No. 16 boiler

Crane Boiler Burner Unit

NAME—Crane No. 16 Sustained Heat boiler burner unit.
PURPOSE—For supplying steam or hot water using oil as a fuel.
FEATURES—This unit combines both boiler and oil burner and is designed exclusively for the combustion of oil. It differs from the conventional in its down draft flue construction with tapered flue ways. This "Sustained Heat" principle is said to be an exclusive Crane patented feature and is said to greatly increase the efficiency of the boiler. Entire unit is enclosed in an insulated metal jacket.
MADE BY—*Crane Co., 836 S. Michigan Ave., Chicago, Ill.*

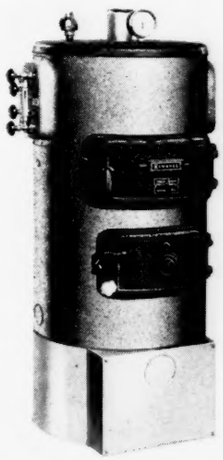
Airtherm Oil Fired Unit Heater

NAME—Directherm unit heater.
PURPOSE—For supplying large quantities of warm air using oil as fuel.
FEATURES—These units have been developed to supply large quantities of warmed air to large buildings such as airplane hangars, garages, warehouses, as well as to isolated buildings to which it is impractical to pipe steam. They also can be used for partial heating of buildings where the cost of central steam plant would be prohibitive. The unit is a self-contained heating system consisting of an oil burner, heat transfer surface and a centrifugal fan for distributing the warm air. Manufacturer states that this heater can be set up for full automatic control both for room temperature and delivery temperature. Units are also available for coal and gas firing.
SIZES—Oil fired unit in six standard sizes from 300,000 to 1,500,000 B.t.u. per hour.
LITERATURE AVAILABLE—Bulletin No. 2-I.
MADE BY—*Airtherm Mfg. Company, 720 So. Spring St., St. Louis, Mo.*



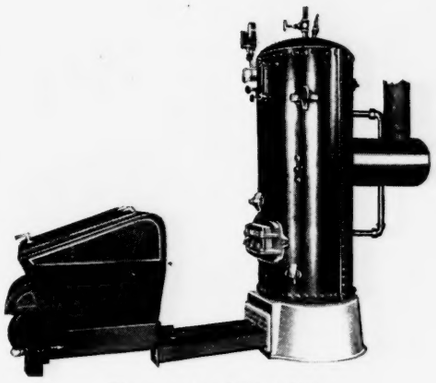
For large volume heating

Kewanee Steel Boiler



No. 1733 Kewanee round steel boiler for oil burning.

NAME AND MODEL NO.—Round type R steel boiler. No. 1733 for oil, and No. 0733 for stoker.
FEATURES—Outstanding features are said to be as follows: made of steel plate, models for oil or stoker come ready for quick assembly, proved efficiency up to 80%, two-pass tubes, water coil for domestic hot water ready installed, doors insulated with refractory lining or baffle liner, door castings with gas-tight ground joints or grooves sealed with asbestos rope gasket, and flues easily accessible from the front for cleaning.
SIZES—For use with steam systems, 275 sq. ft. radiator surface.
DISTRIBUTED BY—*American Radiator & Standard Sanitary Corporation, Pittsburgh, Pa.*



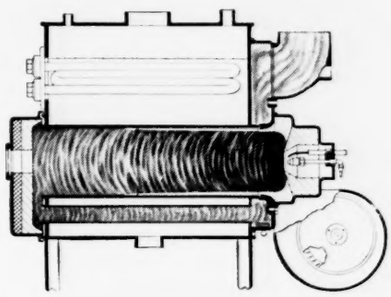
Kisco stoker fired boiler.

Kisco Stoker Fired Boiler

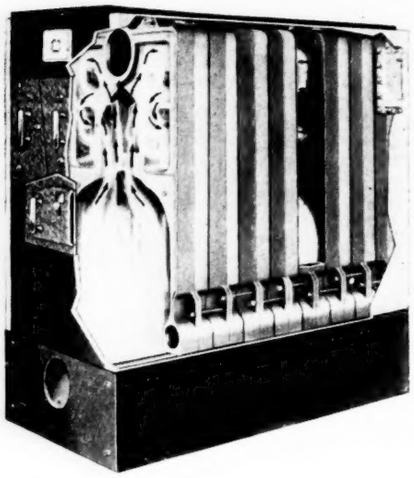
NAME—Kisco stoker fired boiler.
PURPOSE—For supplying steam or hot water using stoker fired coal.
FEATURES—Boiler and stoker unit incorporates a specially designed stoker and combustion chamber which is fitted with Kisco tuyeres. These are designed to supply secondary preheated air to consume practically all of the gases. Unit is also equipped with Kisco new "efficiency booster" which is a miniature horizontal boiler assembled in a steel housing at the smoke outlet of the boiler and is connected to the boiler proper with circulating pipes. Manufacturer states that this device reduces stack losses and improves circulation.
MADE BY—*Kisco Boiler & Engineering Co., 3732 Chouteau Ave., St. Louis, Mo.*

Bethlehem Oil Fired Boiler

NAME—Dynatherm.
PURPOSE—For supplying steam or hot water utilizing oil as a fuel.
FEATURES—This oil fired boiler is shipped complete as a unit including all controls mounted and wired. The size of the crate is 20½ inches wide by 36 inches high. The oil is burned inside a central boiler tube and the gases pass through a multi-tube return before going to the stack. Instantaneous hot water coils are available.
SIZES AND CAPACITIES—Three sizes with capacities ranging from 400 to 865 sq. ft. steam net load.
MADE BY—*Bethlehem Foundry & Machine Company, Bethlehem, Pa.*



Compact boiler burner unit



Smith-Mills "25" Boiler

Smith-Mills Heating Boiler

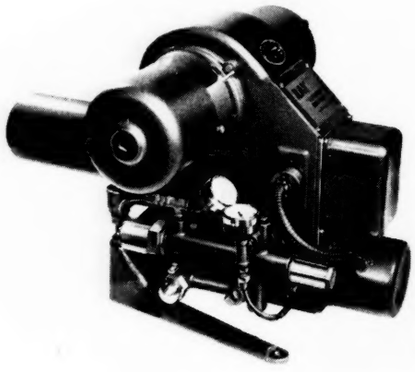
NAME—Smith-Mills "25" boiler.
PURPOSE—For supplying steam or hot water using oil, stoker or hand-fired coal.
FEATURES—Boiler is designed for such buildings as roadside restaurants, monitor stores, garages, small public buildings, and large residences. It is a jacketed sectional boiler with castings made of grey iron. Manufacturer states that gas travel is vertical and lateral as well as horizontal to insure maximum surface contact and high efficiency. Fins have been placed where gases are hottest to provide additional absorption. Provision is made for all necessary controls and a built-in trombone type tank or tankless heater is optional equipment.
CAPACITIES—From 1300 to 2300 sq. ft. standing steam radiator surface.
MADE BY—*The H. B. Smith Company, Incorporated, Westfield, Mass.*

Williams-Wallace Flue Pipe

NAME—Metalbestos gas vent and flue pipe.
PURPOSE—For venting gas fired appliances.
FEATURES—Metalbestos is said to be made of two pipes, an inner pipe of pure aluminum and an outer pipe of galvanized steel. Between the two pipes there is a half-inch air space. Manufacturer claims that this construction results in a pipe that is efficient because it maintains the temperature of the exhaust gases high enough to carry them to the outer air without condensing, that it is safe because it disposes of the products of combustion without allowing them to permeate the chamber where the appliance is situated and that it is durable in construction because the aluminum inner pipe is impervious to sulphurous and sulphuric acids which form the condensate of combustion. Pipe is made in both round and oval shapes and a complete line of fittings is available.
SIZES AVAILABLE — Eight sizes round pipe with inner diameters from 3 to 12 in. and four sizes oval pipe, diameters 3 to 6 in.
LITERATURE AVAILABLE—Catalog 339A.
MADE BY—*Williams-Wallace Co., 160 Hooper St., San Francisco, Cal.*

Ray Heavy Oil Burner

NAME—Ray automatic engineer.
PURPOSE—For burning No. 5 fuel oil in residential and small industrial applications.
FEATURES—A Liquid Bath Heater and Retractor oil control are two new developments incorporated in this burner to attain fully automatic operation of a pressure atomizing oil burner with No. 5 oil. The Liquid Bath Heater is said to operate on the indirect principle of the common kitchen double boiler in order to maintain a uniform oil temperature without cracking or carbonization. At the same time, the fluid bath acts to cool and protect the nozzle from the intense reflected heat of the firebox where carbonization of the oil may clog the nozzle. The Retractor oil control is designed to fill two primary functions —to act as the oil shut-off valve, and also to act as a pump to withdraw the oil from the nozzle and the nozzle fuel tubes after each shut-down of the burner, thus cleaning the fuel tubes and the nozzles after each firing period.
CAPACITIES—From 1½ to 6 gal. of oil per hr.
MADE BY—*Ray Oil Burner Co., 409 Bernal Avenue, San Francisco, Cal.*



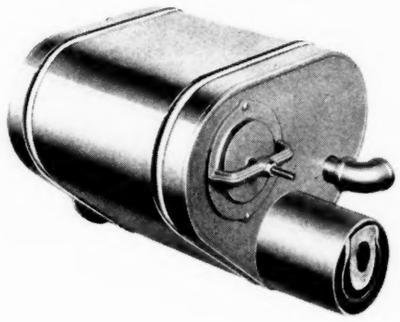
Small oil burner for No. 5 fuel oil.

Iron Fireman Anthracite Commercial Stoker

NAME—Iron Fireman series 35, commercial anthracite stoker.
PURPOSE — For burning anthracite coal in commercial boilers.
FEATURES—Stokers are of the "poweram" underfeed type which uses a metering type worm to deliver the coal from the hopper to the retort and reciprocating coal distributors in the base of the retort to deposit the coal uniformly. The coal is burned on inclined reciprocating grates which gradually move the burning fuels from the retort towards the ash pit. Air for combustion is supplied by a forced draft fan through air ports in the grate bars. Ash is shoveled or hoed from pits to ash doors in the boiler front.
SIZES AND CAPACITIES—Nine sizes with capacities ranging from 25 to 140 boiler hp.
MADE BY — *Iron Fireman Manufacturing Company, 1305 S. W. Twelfth Ave., Portland, Ore., and Cleveland, Ohio.*

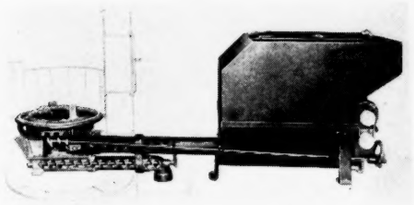
National Machine Gas Burner

NAME—Lo-Blast gas power burner.
PURPOSE—A gas power burner with electric ignition for use with heating boilers and furnaces.
FEATURES—Burner has an electric ignition which eliminates the need for a pilot light, thus reducing the gas consumption. Manufacturer states that this burner is completely automatic and control is entirely by means of a room thermostat. Burner is equipped with a blower to deliver air under pressure to the mixing tube.
SIZES AND CAPACITIES—Two sizes. Unit No. 101 can be adjusted for gas inputs of from 100,000 to 240,000 B.t.u. Unit No. 102 handles gas input from 240,000 to 480,000 B.t.u.
MADE BY—*National Machine Works, 122 S. Michigan Ave., Chicago, Ill.*



Gas conversion burner with electric ignition.

HEATING EQUIPMENT



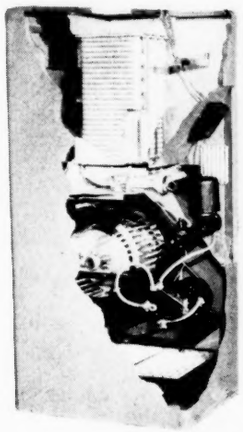
Employs natural draft.

Cornell Stoker

NAME—Cool-Flue.
PURPOSE—For burning coal without mechanical draft.
FEATURES — Manufacturer claims that by eliminating the fan and blower the stack temperature is reduced considerably. Also that clinkers are eliminated and only a small amount of fine ash is created. This ash is said to be removed automatically from the revolving grates and deposited in dustproof containers. Manufacturer claims in case of electrical failure, this stoker may be fired by hand.
MADE BY — *Cornell Manufacturing Company, Indianapolis, Ind.*

Surface Combustion Air Conditioners

NAME—Janitrol air conditioners.
PURPOSE—For winter air conditioning using gas as a fuel.
FEATURES—This new line of gas fired winter air conditioners features such devices as the Amplifire burner and the Multi-Thermex heat exchanger. The Amplifire burner is similar to one which has been widely used by this company in its industrial applications and is said to represent a marked advance in the elimination of any tendency to "on" and "off" noise. The Multi-Thermex heat exchanger consists of a battery of cast-iron Thermex tubes. Integrally cast heat absorption fins are staggered vertically inside each Thermex tube while on the outside are integrally cast convectors. The most generally used sizes of these winter air conditioners are the 60,000 and 90,000 B.t.u. capacity units which are shipped completely assembled. This feature makes it possible for the factory to make complete tests and final inspection of the unit in actual operation before it is crated.
MADE BY—*Surface Combustion Corporation, Toledo, Ohio.*



For complete winter air conditioning.

Johns-Manville Insulation

NAME—L-W Superex.
PURPOSE—For insulating at temperatures up to 1500F.
FEATURES — This material is furnished in both block and piping covering form. It is of the moulded diatomaceous silicate type and is said to be light in weight, weighing only 20 lb. per cu. ft. Blocks are furnished in 3, 6, 9 and 12 in. widths in standard lengths of 18 and 36 in., and in thicknesses from 1 to 4 in. Pipe insulations are supplied in standard sizes in sections 3 ft. long and 2½ in. thick.
MADE BY—*Johns-Manville, 22 East 40th Street, New York, N. Y.*

McDonnell Humidifying Valve

NAME — McDonnell humidifier water control.
PURPOSE—For controlling the flow of water to humidifier pans.
FEATURES—Control features a snap-action valve which is designed to eliminate valve sticking or clogging. A cam and roller action causes the valve to snap from tight closure to wide open whenever the water level drops one quarter of an inch. Designed for use against water pressure up to 150 lbs. Made in three styles: No. 17, valve and float only; No. 117, valve and float in covered float chamber; No. 217 includes copper tubing and a means of tapping into the water main.
MADE BY—*McDonnell & Miller, Wrigley Bldg., Chicago, Ill.*

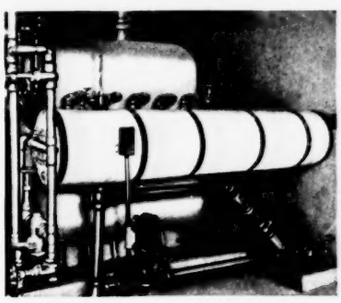
Pan American Solar Water Heater

NAME—Pan American Solar heater.
PURPOSE—For heating service hot water using solar energy.
FEATURES—This service hot water system consists of a solar heat absorbing unit and an insulated storage tank. The solar heating unit is made up of flat drawn copper tubing mounted on a corrugated copper backing. Between this backing and the bottom of the enclosing box is an insulated area made up of Reynolds Metallation and two air spaces. This whole unit is housed in a metal box with a double glazed window in the top. The heated water from the coil in the box goes to an insulated horizontal tank where it is stored until needed. Manufacturer states that this heater is guaranteed not to freeze.
MADE BY—*The Pan American Solar Heater, Inc., 2730 N.W. 2nd Ave., Miami, Fla.*

Domestic hot water from the sun.

Taco Tankless Water Heater

NAME—Flo-Line Tankless Taco.
PURPOSE—For heating large volumes of domestic hot water.
FEATURES — This heater is offered for buildings requiring large volumes of domestic hot water during heavy peak demand periods. While similar to the Hi-Flo Tankless Taco in construction, it is installed entirely below the boiler line. A Taco circulator controlled by an electric aquastat is provided to insure a rapid transfer of heat from boiler water to domestic hot water. During periods of no draw when the circulator is not operating, the boiler water circulates through the heater by gravity through a "gravity by-pass". This check valve closes when the circulator operates to prevent short circuit. The heater is designed so that the domestic water comes in contact only with bronze and copper.
SIZES & CAPACITIES—From 340 to 1660 gal. per hr., 40F to 140F with boiler water at 180F.
MADE BY — *Taco Heaters, Inc., 342 Madison Ave., New York, N. Y.*



For large quantities of hot water.

Sterling Float and Thermostatic Trap

NAME—Sterlco float and thermostatic trap.

PURPOSE—For separating air and water from steam.

FEATURES—These traps have recently been redesigned and are said to have greatly increased capacity ranges. They incorporate combined float and bellows and are said to be suitable for all steam conditions from 25 in. vacuum to 20 lbs. pressure. Air is vented continuously by means of a bellows-controlled valve near the top of the trap. A separate water outlet is controlled by a copper float in the trap body. Two inlets on the side and

Sterlco Trap.

top and two outlets on the side and bottom permit assembly into the line in a number of different pipe arrangements. Removal of four screws permits access to the operating parts without removing the trap from the line.

CAPACITY—400 lbs. of water per hour at 2 lbs. steam pressure and 1200 lbs. at 20 lbs. pressure.

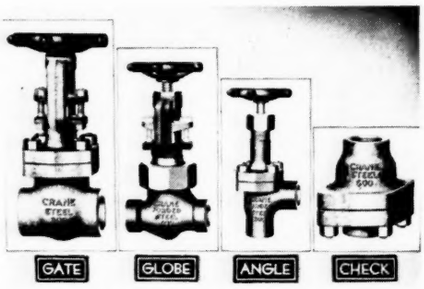
MADE BY—*Sterling Inc., 3732 N. Holton Street, Milwaukee, Wis.*

Crane Steam Valves

NAME—Crane steam valves.

PURPOSE—For controlling the flow of steam and oil at pressures up to 600 lbs.

FEATURES—This line of valves includes gates, globes, angles, and checks. Valves are available in sizes ¼ to 2 in. inclusive and in both inside screw and O.S. and Y. construction, union, and bolted bonnet with screwed, socket weld, and flanged end types. The gate valves are made of cast steel while globe and angle valves are made of forged steel, and the check valves are made of forged steel in horizontal patterns, and cast steel in vertical ball patterns. Casting for these valves are made from steel which is melted by high frequency induction methods and the castings are inspected by periodic



For pressures up to 600 lbs. steam.

x-ray and gamma ray radiographic methods. Manufacturer states that as a result of the applications of these advanced methods the Crane radio-cast steel complies with the A.S.T.M. specification A-216, covering high grade carbon steels.

MADE BY—*Crane Company, 836 S. Michigan Ave., Chicago, Ill.*

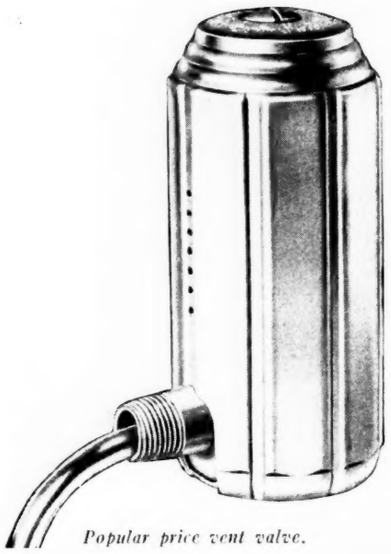
Marsh Automatic Vent Valve

NAME—Airovent No. 10 A, No. 20 A.

PURPOSE—For venting air from steam heating systems.

FEATURES—These valves are said to offer, at a popular price, many of the features which are incorporated in the higher priced Marsh line of valves. Some of the features include Marsh multiport silent venting, leak-proof and spit-proof operation, rapid venting of air and modern streamlined appearance. Airovent is made in two styles, No. 10 A automatic air valve and 20 A, air and vacuum valve. The vacuum feature includes a check which prevents return of air into the valve when condensing steam begins to form a vacuum. As the vacuum force increases the internal diaphragm expands and closes the valve.

MADE BY—*Jas. P. Marsh Corporation, 2073 Southport Ave., Chicago, Ill.*



Popular price vent valve.

Anderson Steam Traps

NAME—Super-Silvertop traps No. 19 and 20.

PURPOSE—For draining condensate from steam equipment.

FEATURES—These traps supersede No. 11 and 12. Head and body of these traps are connected together with four bolts in a flange type connection. These traps have a bronze hexagonal bucket guide tube and the valve and lever mechanism is of new design with no pins or pivots. They have a drain plug at the bottom and the maximum operating pressure is 200 lb. as compared with 150 lb. on the old No. 11 and 12 traps. They are said to have

Greater capacity and higher pressure.

a greater capacity than the traps they replace.

MADE BY—*V. D. Anderson Company 1935 W. 96 St., Cleveland, Ohio.*

Armstrong Steam Traps

NAME—Armstrong steam traps, No. 800 and No. 801.

PURPOSE—For removing air and condensate from steam lines.

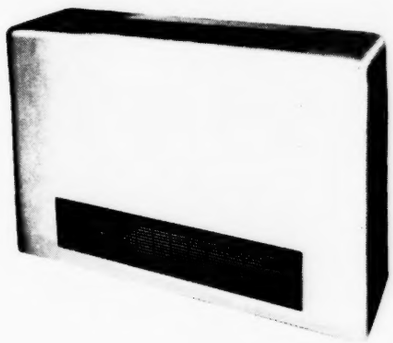
FEATURES—These traps supersede the small 200 series traps formerly produced by the company. Features are said to include more rugged construction with more metal added at connecting points and around water passages, freer flow of water, one-piece stainless steel bucket, and single casting size for both ½ in. and ¾ in. pipe connections. No. 800 trap is for use on straight through pipe connections. Either trap may be equipped for "blast" trap service using buckets which have an auxiliary thermic air vent. When thus equipped, these traps are said to be capable of handling from 50 to 100 times as much air as regular traps. Both traps have the inverted bucket operating principle.

MADE BY—*Armstrong Machine Works, Three Rivers, Mich.*

HEATING EQUIPMENT

Trane Convectors

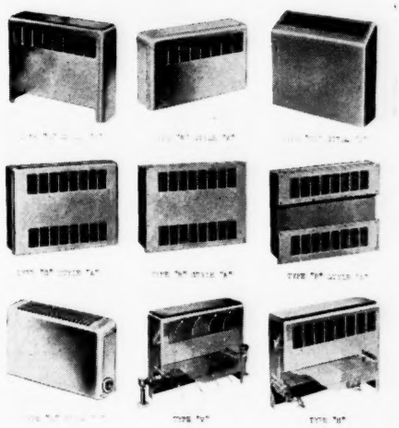
NAME—Trane Force-Flo convectors.
PURPOSE—For heating entrances.
FEATURES—Lobbies, all types of entrance halls and stairways are a few of the locations where these convectors are applicable. Convector is available in two floor type units, one wall and one ceiling type. They incorporate Trane heating coil and blower. Three control arrangements are available—constant, two, and multi-speed. The two-speed control which is standard is mounted in the end of the cabinet, thus eliminating the need for separate control mounting.
MADE BY—*The Trane Company, LaCrosse, Wis.*



For heating building entrances.

Young Streamaire Convectors

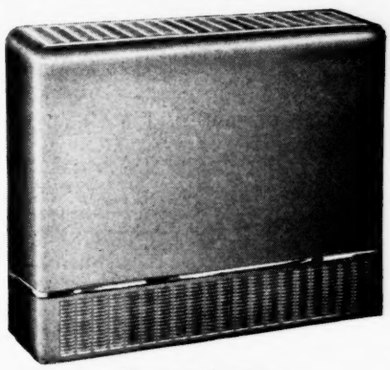
NAME—Young Streamaire convectors.
PURPOSE—For heating air.
FEATURES—These convectors are made with two component parts, the heating element and the enclosure. The heating element consists of copper tubes through which steam or hot water passes, copper fins which act as extended heating surfaces and the supply and return tanks to which the piping connections are made and which are designed to distribute the steam or hot water properly through the tubes. The convectors are furnished with two types of heating elements. Type V, an elliptical tube element for use with vapor, vacuum, one pipe steam and hot water installations and type H, a round tube element for forced hot water heating systems. The type V elliptical tube has a large cross sectional area which is said to result in exceptional performance of this heating element on vapor or vacuum steam systems. These elements will stand operating gauge pressures of 50 lbs. per sq. in. saturated steam. The type H element copper tubes are equipped with specially designed spiral agitators to increase the rate of heat transfer. These convectors are designed for working pressures up to 100 lbs. per sq. in. hydrostatic pressure. The enclosures are made in 3 different types. They can be installed as free standing cabinets, wall hung cabinets, or can be partially recessed in the wall. They can also be completely recessed so that the front panels will be flush with the plaster, or, if desired, they can be furnished with plaster fronts so that only the upper and lower grilles are visible.
TYPES—Free standing cabinet convectors type C; wall hung cabinet convectors, type W; wall hung type convectors, type WS; partially recessed convectors, type S; fully recessed convectors, type R; bathroom cabinet convectors, type L and plastered-in concealed convectors, type P.
MADE BY—*Young Radiator Company, Racine, Wis.*



Young Streamaire convectors.

McQuay Cabinet Unit Heater

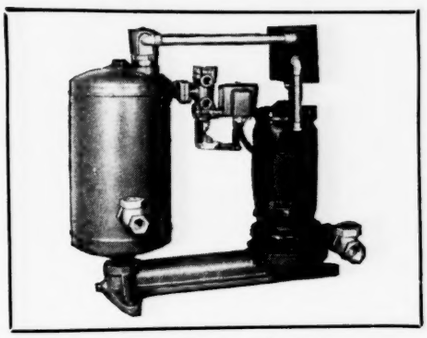
NAME—McQuay cabinet type unit heater.
PURPOSE—For spot heating in vestibules, stairways, halls as well as shops and stores.
FEATURES—Unit heater is available in three styles, wall type, floor type and suspended model. It is equipped with two quiet operating fans and all piping and electrical connections are made within the cabinet. Cabinet is made of steel with baked enamel.
MADE BY—*McQuay, Inc., 1619 Broadway N.E., Minneapolis, Minn.*



For spot heating.

Johnson Boiler Feed Pump

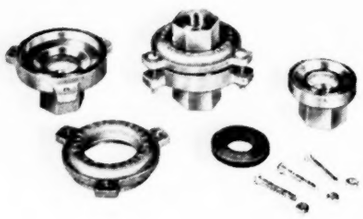
NAME & MODEL NO.—Boiler feed pump 30SH.
PURPOSE—For returning feed water to boilers.
FEATURES—This is said to be a small and less expensive model of the Johnson pump which is used in large power plants and heating plants. It consists of a cylindrical receiving chamber and a vertical close coupled centrifugal pump mounted on a cast iron base. This base has a pipe cast integrally which connects the receiver to the pump suction. Stationary electrodes are suspended into the top of the receiver and control a solenoid operated valve which is mounted between the pump and the receiver. The pump utilizes the pressure equalizing principle of boiler feeding. Manufacturer states that the pump will handle condensate as hot as 300F without danger of vapor binding.
SIZES & CAPACITIES—10 gal. per min. and suitable for boilers up to 30 hp.
MADE BY—*Johnson Corp., Three Rivers, Mich.*



For returning condensate.

Tuttle & Bailey Copper Convectors

NAME—Tuttle & Bailey copper convectors.
PURPOSE—For room heating using either hot water or steam.
FEATURES—Convector element is made entirely of copper and the copper tube is said to be designed to combine minimum resistance to air flow with maximum contact with fins and ample capacity for the heating medium. Contact between the fins and tubes are by metallic bond. For controlling the capacity of convectors, a damper is provided which can be operated through the bottom opening of the enclosure. Dampers are packed as complete units and can be applied on the job or in the distributor's warehouse. Both convectors and heating element are packed in cartons to prevent damage during shipping.
MADE BY—*Tuttle & Bailey, Incorporated, New Britain, Conn.*



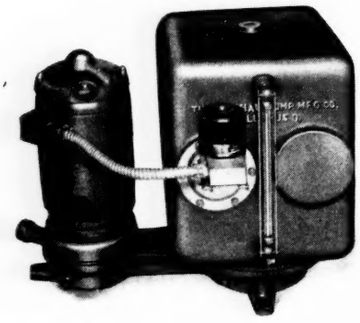
Swing joint for steam lines.

Patterson-Ballagh Swing Joint

NAME—Patterson-Ballagh swing joint.
PURPOSE—For providing a flexible connection in steam lines.
FEATURES—Manufacturer states that this joint may be used upon lines with steam pressures up to 100 lb. Joint is said to be made of heavy bronze and to have a sealing unit which is a specially shaped and compounded rubber gasket. This gasket contains a percentage of metallic lead milled directly into the rubber. It is claimed that the gasket expands slightly under the heat which helps to maintain a perfect seal.
SIZES—¾ in. straight style.
MADE BY—*Patterson-Ballagh Corporation, 1900 East 65th Street, Los Angeles, Cal.*

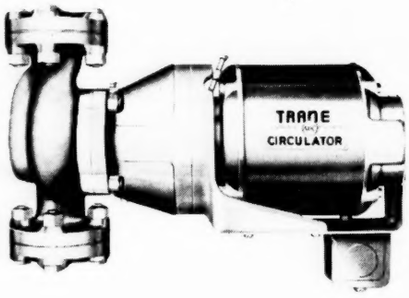
Weinman Condensate Return Pump

NAME — Unipump Condensate Return Unit.
PURPOSE—For returning condensate from heating systems to boiler.
FEATURES—These condensate return pumps consist of a Weinman Unipump vertically mounted, a strainer, drip pocket, receiver and automatic float switch control. The pumps, which are fully bronze fitted, have a motor mounted vertically above them which is said to reduce the danger of submergence in the event of flood or other emergency conditions. This vertical mounting is also said to provide the lowest possible level for the pump — fully submerging the impeller even with the minimum working level in the receiver. A drip pocket is incorporated in the design of the Unipump for collecting any stuffing box leakage. Receivers are shaped so that their maximum capacity is utilized, between high and low water levels. Automatic operation is secured through a float switch actuated by ball float on a rigid arm within the receiver. Condensate return pumps are also supplied with the receiver tank beneath the motor with the pump mounted inside the tank. The type of unit is intended for use wherever the return line is below floor level.
SIZES AND CAPACITIES—Nine sizes with receiver capacities ranging from 15 to 60 gal. and for serving systems with square foot of radiator surface between 1500 and 30,000.
MADE BY—*The Weinman Pump Manufacturing Co., 290 Spruce St., Columbus, Ohio.*



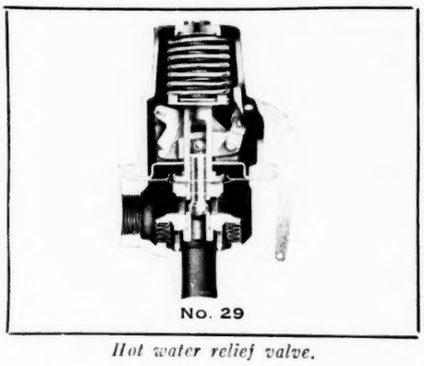
Suitable for 1500 to 30,000 sq. ft. radiation.

Trane Warm Water Heating Systems



Trane Circulators

NAME—Trane warm water heating systems.
PURPOSE—For residential heating using water as a heat transfer medium.
FEATURES—This system is a one-pipe, pressure, forced, hot water system and consists of a hot water boiler, Flo Valve, circulator, single pipe flow fittings, Trane convectors, and automatic feed and relief valve. The circulator is said to be carefully balanced for quiet vibration performance. The Trane Flo Valve is designed to control the water circulation and permits circulation only when heat is required. The flow fittings are available for both iron and copper pipes and are attached to the return pipe from each convector. The automatic feed and relief valve is designed to maintain the proper pressure on the system. Convectors are available in fully recessed, semi-recessed, and free standing models.
LITERATURE AVAILABLE—Bulletin S355.
MADE BY—*The Trane Company, La Crosse, Wis.*



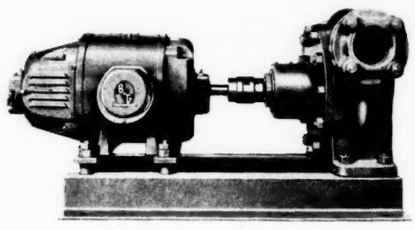
Hot water relief valve.

McDonnell & Miller Safety Valve

NAME—No. 29 safety valve.
PURPOSE—For relieving pressure in hot water systems.
FEATURES—Valve is known as the No. 29 safety valve and is named for its relief point of 29 lb. Manufacturer states that it is designed so that it will snap open to its full orifice capacity when the relief point of 29 lb. is reached. It is said to discharge its full capacity until the boiler pressure is reduced to 22 lb., at which time it snaps to instantaneous closure. Other features include hardened stainless steel valve with metal-to-metal seal above the cone to protect working parts when valve is discharging and factory adjustment which is said to prevent tampering. Valve is fully A.S.M.E. approved.
MADE BY—*McDonnell & Miller, Wrigley Building, Chicago, Ill.*

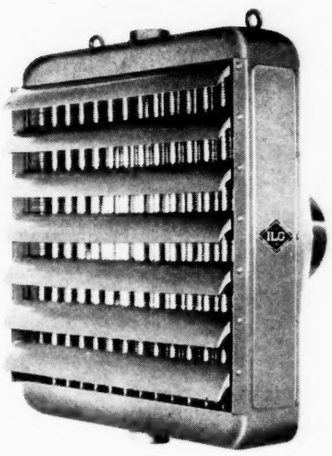
B & G Hot Water Pumps

NAME—B & G belt driven pump and B & G universal type pump.
PURPOSE—For circulating water in forced hot water heating systems.
FEATURES—The belt driven pump is designed for head pressures up to 25 ft., and is available in two capacities, with ½ hp. and ¾ hp. motors, respectively. These units are equipped with 3 in. connections. Universal type pump is designed to handle head pressures up to 90 ft.
MADE BY—*Bell & Gossett Co., 3000 Wallace St., Chicago, Ill.*



B & G Universal type pump.

HEATING EQUIPMENT



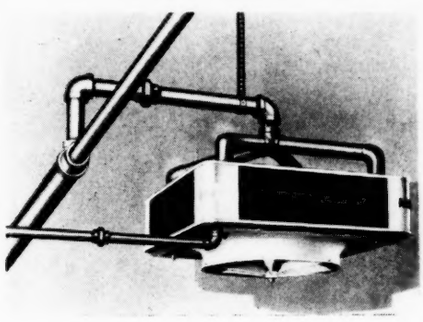
Ilg stream-styled unit heater.

Ilg Stream-Styled Unit Heater

NAME—Ilg Stream-styled unit heater.
PURPOSE—For warming air.
FEATURES—Unit heater features a two-piece graduated header to assure trouble free operation on all steam pressures and to give balanced steam distribution. Entire core of the heater is made of copper and fins are flanged and pressed on tubes for permanent union. The bottom header floats on slotted coil retainer and spring washers, to permit expansion and contraction of the coil independent of the casing. Motor is of a self-cooled type, specifically designed for these heaters.
MADE BY—*Ilg Electric Ventilating Company, 2850 North Crawford Avenue, Chicago, Ill.*

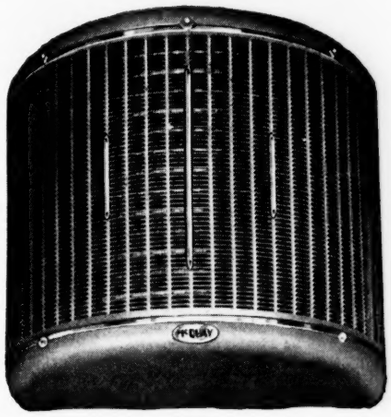
Modine Vertical Delivery Unit Heaters

NAME—Modine vertical delivery unit heaters.
PURPOSE — For use wherever conditions call for more directly downward delivery of heated air than is provided by the conventional design of unit heaters.
FEATURES — Each unit is equipped with a radial or spoke-type deflector assembly known as the "Modine Cone-Jet Deflector." By manual adjustment of the individual deflector blades the delivered air may be concentrated in limited directions—even kept almost to the one side of the unit. Thus, in the multiple installation of Modine verticals, heated air deflection may be controlled so as to give more delivery of air to outside walls thereby conforming to normal heating requirements. By employing a steep angle of pitch on the deflectors, a high, narrow, jet-like cone of heated air may be thrown from a high elevation. When the unit is mounted relatively close to the floor the deflectors can be flattened for delivery of a low, broad cone of heated air. These unit heaters are built so they may be suspended directly from the supply branch without the use of hanger rods or straps. All Modine unit heaters are protected by the Bonderizing process.
LITERATURE AVAILABLE—Bulletin 140-A.
SIZES AND CAPACITIES—11 models, capacities from 30,000 to 471,600 B.t.u. per hr.
MADE BY — *Modine Manufacturing Company, Racine, Wis.*



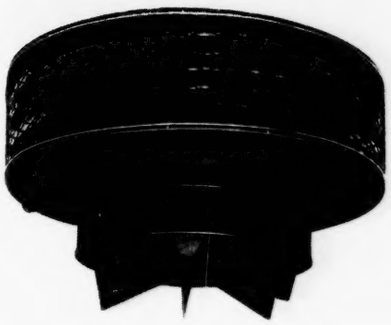
Modine vertical delivery unit heaters.

McQuay Radial Unit Heater



McQuay radial unit heater.

NAME—McQuay Radial unit heater.
PURPOSE—For supplying heated air.
FEATURES—Manufacturer states that one radial unit heater can be used in place of two or more of the standard single direction heaters. The unit is made in one style for suspension only and is encased in a semi-circular steel casing finished in brown baked-on wrinkled enamel.
SIZES—Seven cabinet sizes in 22 capacities from 41,690 to 476,000 B.t.u. per hr.
LITERATURE AVAILABLE—Bulletin No. 750.
MADE BY—*McQuay Inc., 1618 Broadway, N.E., Minneapolis, Minn.*



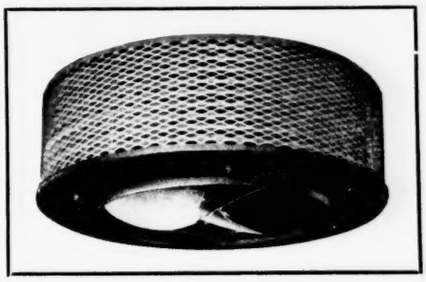
American Blower vertical heater.

American Blower Unit Heater

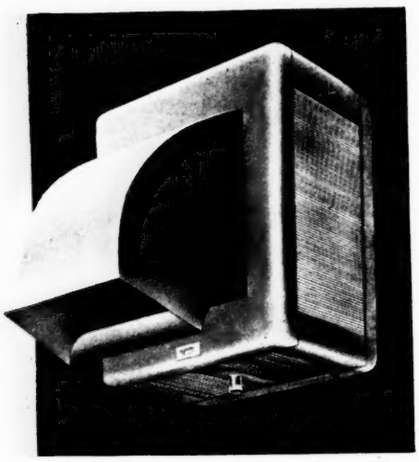
NAME—American Blower heater.
PURPOSE — For supplying heat for either high or low ceiling applications.
FEATURES—Heating elements are designed to operate on steam pressures up to 150 lb. per sq. in. Units are supplied with either constant speed, two-speed, or variable speed motors having a low speed approximately 50 per cent synchronous speed.
SIZES—Twelve sizes from 30,000 to 600,000 B.t.u. per hr. with 2 lb. steam and 60F entering air.
MADE BY—*American Blower Corporation, Div. American Radiator and Standard Sanitary Corp., 6000 Russell Street, Detroit, Mich.*

McCord Projection Unit Heater

NAME—McCord unit heater.
PURPOSE—For supplying heated air.
FEATURES—Manufacturer states that the circular shape vertical type heater is particularly adapted to the McCord spiral fin tube construction because the shape and design of the fin creates air turbulence without undue restrictions, thus increasing heat transfer. The copper fins are metallically bonded to the copper tubes. The heating element has been tested to 2000 lb. hydrostatic pressure and is guaranteed for 200 lb. saturated steam pressure. The entire unit has been designed around Torrington quiet operating fan blades and the manufacturer claims that as a result the unit can be used in many installations not previously considered adaptable to vertical type heaters.
MADE BY—*McCord Radiator & Mfg. Co., Detroit, Mich.*



McCord vertical type unit heater.



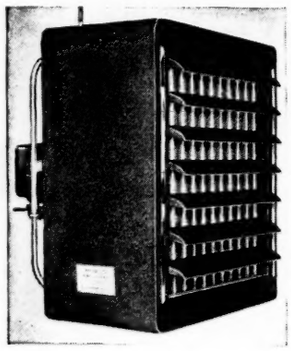
Webster-Nesbitt projection type unit heater.

Webster-Nesbitt Projection Type Heater

NAME — Webster - Nesbitt Projection Type Heater.
PURPOSE—For air heating.
FEATURES—This heater is designed for ceiling suspension and gives results typical of blower-fan units. The unit makes use of a propeller fan and draw-through. It has a four-side element and high outlet velocities permitting heating of large areas. A specially shaped discharge nozzle directs the heat where needed.
MADE BY—*John J. Nesbitt, Inc., Holmesburg, Philadelphia, Pa., distributed by Warren Webster & Company, Camden, N. J.*

Murray Unit Heater

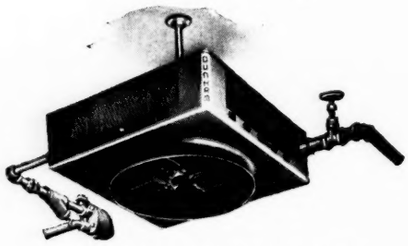
NAME—Murco unit heater.
PURPOSE—For space heating.
FEATURES—Heating elements have heavy wall copper tubes and fins of the latest design. Condenser is full floating to overcome contraction and expansion. The unit is equipped with a unit heater duty totally enclosed motor. Case has a crackle finish, trimmed with chromium strips.
MADE BY—*D. J. Murray Mfg. Co., Wausau, Wis.*



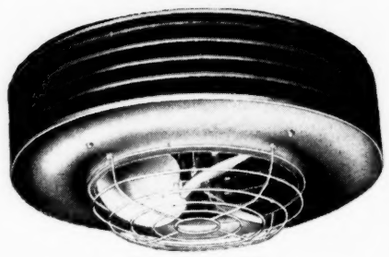
For space heating.

Dunham Downflo Type Unit Heater

NAME AND MODEL NUMBER — Downflo unit heater, type C.
PURPOSE—For supplying a large volume of heated air at a relatively high velocity and low temperature vertically downwards to working levels.
FEATURES—This unit heater is designed for use in applications such as factories with high ceilings, factories where high clearances are necessary for clearing industrial equipment such as cranes and for over-doorway heat requirements of stores and office buildings. Heater is designed so that the motor and fan assembly may be removed for inspection or service without the necessity of removing the heater from the hanger or the disconnecting of the pipes. Casing is of heavy furniture metal. Motor, with the fan mounted directly on its shaft, is attached to spider members which grip a special resilient mounting which, in turn, is mounted on a conical air guide. Fan blades are said to be of improved design set and shaped to the proper pitch and are designed for subdued air noise. Heaters are arranged for central support from a single hanger by a formed spider. A hole in the spider accommodates the pipe which serves as a hanger. Heating element is designed for operating at steam pressures up to 125 lb. and is made entirely of non-corrosive material. The air volume and temperature adjustment are provided by means of adjustable dampers. It is said that adjustment is readily made and retained in place. A choice of either top or side inlet is available for ease in connecting the steam piping. When properly installed, these heaters may be used on forced hot water systems.
SIZES AND CAPACITIES—Ten sizes with capacities ranging from 25,700 to 468,000 B.t.u. per hour based on steam at 2 lb. gage and 60F entering air. Air velocities range from 440 c.f.m. to 7000 c.f.m. Hot water capacities from 23,100 to 421,000 B.t.u. per hr. with 200F average water and 60F entering air.
MADE BY—*C. A. Dunham Company, 450 East Ohio St., Chicago, Ill.*



Dunham type C Downflo unit heater.



McQuay down-flow unit heater.

McQuay Down-Flow Unit Heater

NAME—McQuay Down-Flow unit heater.
PURPOSE—For supplying heated air downward to the working levels.
FEATURES—It is said that these units are particularly adaptable to high ceilings where they reclaim wasteful stratified heat and force the warm air down to the working zone over a wide area. The heating element is designed to operate on steam or forced hot water. All units can be supplied with variable speed motors which is said to offer a simple and inexpensive method of controlling the heat output.
LITERATURE AVAILABLE—Bulletin No. 745.
MADE BY—*McQuay Inc., 1619 Broadway St., N.E., Minneapolis, Minn.*

Young Unit Heater

NAME—Vertiflow unit heater.
PURPOSE — For heating industrial buildings, stores, and similar structures having high ceilings.
FEATURES—These units may be installed high above the floor and are said to eliminate any possibility of air stratification and to assure little difference between the floor and ceiling temperatures.
SIZES & CAPACITIES—12 sizes from 63,000 to 480,000 B.t.u. per hr.
MADE BY—*Young Radiator Company, Racine, Wis.*

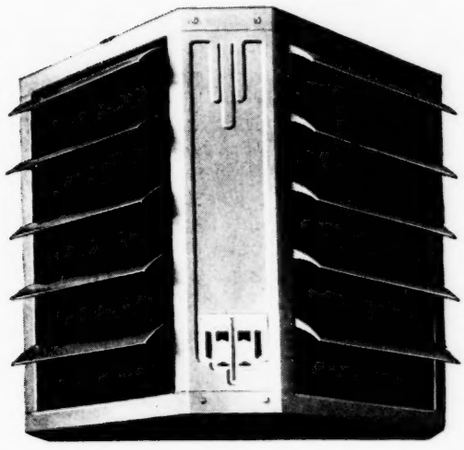
Young Vertiflow Unit Heater.

HEATING EQUIPMENT

Buffalo Unit Heater

NAME — Buffalo Model "VD" Unit Heater.
PURPOSE—For heating large areas.
FEATURES—This unit heater is primarily suited for large area heating where machinery, cranes, and other obstructions make it more convenient to mount the units overhead—blowing down 15 to 50 ft. It is said to serve the double purpose of heating in winter and ventilating or circulating air for summer cooling. The outlet design provides four-way distribution with various velocities of discharge. The standard outlet can be adjusted or changed on the job which is said to make it possible to avoid cold spots or drafts. Other outlet designs are available to meet unusual conditions.
SIZES AND CAPACITIES—Three sizes, 24, 30 and 36 in. for 5000, 7500 and 10,000 c.f.m. respectively.
MADE BY — *Buffalo Forge Company, Buffalo, New York.*

Kisco Heat Recirculator



Projects two streams of heated air.

NAME—V-Type "Q-T" heat recirculator.
PURPOSE — A large capacity unit heater designed especially for installations in large spaces such as warehouses, garages, auditoriums and like buildings.
FEATURES — Instead of a single warm air stream, this unit heater projects two streams of heated air at right angles to each other. Manufacturer states that one unit thus accomplishes the work of two ordinary units. Only one motor, one fan, and one inlet and outlet connection are employed. Manufacturer claims especially quiet operation due to specially designed over-lapping fan blades and resilient rubber mounting.
MADE BY—*Kisco Company, Inc., St. Louis, Mo.*

For providing a vertically downward discharge stream of heated air.

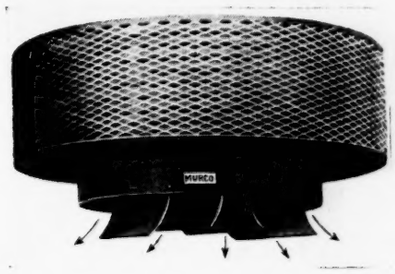
Herman Nelson hiJet Heater

NAME — Vertical Shaft propeller-fan type hiJet heater.
PURPOSE—To provide a vertically-downward discharge of heated air for applications where this type of discharge is desired.
FEATURES—Two distinct types are available, the model BMH for high-ceiling locations and the model AMH for lower ceiling locations. This first model is available in three different outlet arrangements; No. 1 will project a single column of air straight down; No. 2 projects two columns of air at angles of 30° to vertical and No. 3 arrangement projects the air at 30° to vertical in all directions. Adjustment is provided to vary the outlet velocity 25% from maximum. The second type, Model AMH, has two discharge arrangements. No. 1 provides a louver which directs one-half the heated air in one direction and one-half in the opposite direction; arrangement No. 2 has a specially designed outlet for the diffusion of heated air. The heating element provides many features such as expansion bends and a patented stay tube which assure longer life. In addition, three distinct heating elements will be available for each unit to provide a sufficiently low outlet temperature at higher pressures to permit satisfactory results. The fan, designed with wide face area and an aerodynamic or streamline shape, is said to operate efficiently and quietly.
SIZES & CAPACITIES—Model AMH is available in six sizes providing from 43,000 B.t.u. to 193,000 B.t.u. with air deliveries from 545 to 2620 c.f.m. Model BMH is manufactured in capacities ranging from 98,000 B.t.u. to 500,000 B.t.u. with air deliveries from 1330 to 7050 c.f.m.
MADE BY—*The Herman Nelson Corporation, Moline, Ill.*

Schoedinger Unit Heater

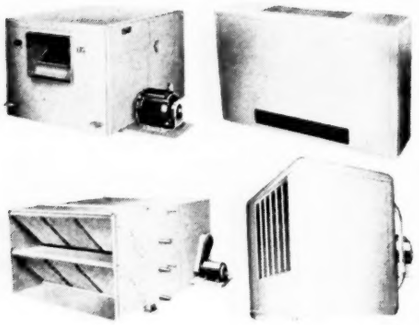
NAME — FOSCO suspended type gas fired unit heater.
PURPOSE—For air heating using gas as a fuel.
FEATURES — Unit heater is of the suspended type and is completely automatic in operation. It is of two-speed, two-heat capacity type. Manufacturer states that it is possible to reduce the motor speed from 1140 r.p.m. to 825 r.p.m. and at the same time to automatically shut one burner off. This permits the heater to operate at reduced speed and heat capacity. It is said that air noises are eliminated when operated at the lower speed. Unit heater is supplied with room thermostat adjustable between 55 and 85F. Also included are an automatic safety pilot, pressure regulator, main shut-off valve and fan switch. The speed fan switch is provided on the heater to allow the fan to be operated during the summer.
SIZES AND CAPACITIES—Three sizes, S-90, capacity 90,000 B.t.u. per hr. single speed. S-2-90, 45,000 and 90,000 B.t.u. per hr., 2 speeds and S-180, 180,000 B.t.u. per hr. single speed. All capacities are input.
MADE BY — *F. O. Schoedinger, 322 Mt. Vernon Ave., Columbus, Ohio.*

Murray Projection Unit Heaters



Murco projection unit heater.

NAME—M Series Murco.
PURPOSE—A vertical projection unit heater for supplying warmed air.
FEATURES — These unit heaters are made with the heating element of all copper and bronze, with few brazed joints. Copper fins are metallically bonded to the copper tubes which is said to give a permanent bond. Manufacturer recommends these heaters for such applications as blanking of cold drafts in front of doorways in markets, industrial, office and similar buildings with high ceilings, or in any building that has a wide area to be heated. They are made in 11 models.
MADE BY — *D. J. Murray Mfg. Co., Wausau, Wis.*



Trane Climate Changers. Upper line (L to R) horizontal model A, floor type model F. Lower line (L to R) horizontal type M and spot cooler type X.

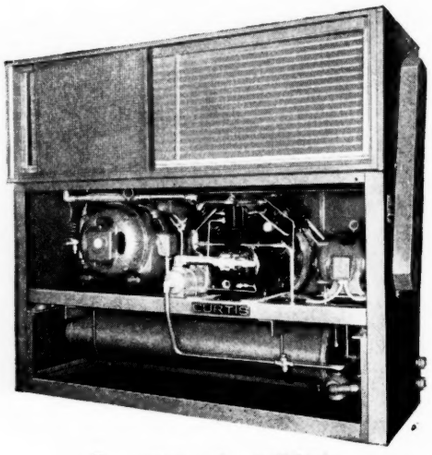
Trane Climate Changers

NAME—Trane Climate Changers.
PURPOSE—For conditioning of air.
FEATURES—This line has been redesigned and revised to incorporate the latest developments in the air conditioning field and to include all of the Trane unit coolers and air conditioners under the single designation of Trane Climate Changers. The line is made up of 5 individual type units. Type D includes a group of air conditioners for a wide variety of applications. Sizes range from small horizontal and vertical models for hotel and office application to large commercial units capable of delivering a maximum of 20,000 c.f.m. Type A units have been designed expressly for apartment house applications—for individual apartment air conditioning. They are available in both vertical and horizontal models and may be placed in a closet or any out of the way spot or furred into the ceiling. The type F climate changer is a floor type unit and provides year-round air conditioning for home or office. It occupies a minimum of floor space and is furnished in a neutral color which blends with any interior. Type M is designed especially for installation where economy is the deciding factor in a selection of equipment. All of the essential features of complete air conditioning are incorporated in this unit so that quality air control can be obtained at lowest possible cost. It is available in both vertical and horizontal models. The type X climate changer is a propeller type comfort cooler recommended for spot cooling. Also announced at this time is a Trane sprayed coil unit designed especially for a built-up system requiring a separate fan motor, drive and filters. Because its coils are sprayed, this unit provides air washing in winter or summer. During the heating cycle, either steam or hot water may be used with humidification obtained by means of washer type spray nozzles. During the summer, cold water, brine or direct expansion refrigerants may be used for cooling.
CAPACITIES—Type D, up to 20,000 c.f.m. Type A, 300 to 1600 c.f.m. Type F, 250 to 1500 c.f.m. Type M, 1200 to 12,500 c.f.m. and Type X, 530 to 2250 c.f.m. Sprayed coil unit type, 2000 to 48,000 c.f.m.
MADE BY—*The Trane Company, La Crosse, Wisconsin.*

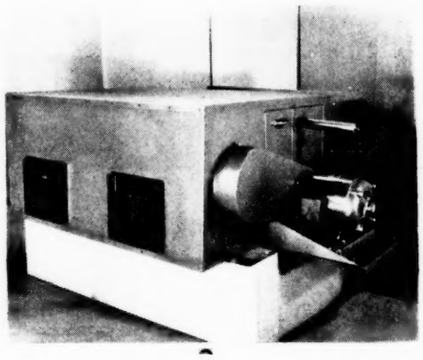
Upper line (L to R) Type D Climate Changers, large and small horizontal types. Lower line (L to R) sprayed coil unit, type D medium vertical unit and type D small vertical unit.

Curtis Air Conditioners

NAME—Curtis central type air conditioners.
PURPOSE—For summer conditioning.
FEATURES—These air conditioners are designed for large establishments where a short duct may be needed to obtain proper air distribution. Units are supplied complete and are said to be easily installed.
SIZES AND CAPACITIES—Available in 3 sizes with maximum compressor unit motor ratings of 9, 12 and 18 hp.
MADE BY—*Curtis Refrigerating Machine Company, St. Louis, Mo.*



For summer air conditioning.



Marlo air conditioning unit model C.

Marlo Air Conditioning Units

NAME AND MODEL NO.—Marlo air conditioning and industrial units, model C suspended type and model F floor type.
PURPOSE—For complete winter and summer air conditioning.
FEATURES—These units are designed to provide any part or all of the air conditioning functions using any common type of refrigerant or heating medium. Reasonable combinations of coil surface for air cooling or heating are available up to 12 rows. Manufacturer states that by these means and by changing blower speeds, complete flexibility is had to balance any reasonable combination of duty and air volume. Frames are made up of angle iron bent and electric welded. The blower scrolls, shaft bearings, motor base, coil condensate pan and filter section are all mounted on the frame members to support the weight and strain directly off the frame itself and in no case do the covering sheets or panels bear any loads. Frame assembly is primed and painted with a corrosion resistant lacquer. Interior surface is further coated with an emulsified asphalt-asbestos sound deadener and corrosion retardant. When insulated, units are provided with ½ in. thickness of insulation applied in emulsified asphalt-asbestos mastic and then coated with the same material so that the entire inside surface is protected against moisture absorption and yields a sound deadening effect. Fans are of the forward curve centrifugal type. Motors are equipped with an adjustable slide, rubber mounted on a base bolted to the frame of the unit. An adjustable V belt motor sheave facilitates adjustment of fan speed.
SIZES AND CAPACITIES—Both ceiling and floor unit available in 10 sizes with capacities ranging from 900 to 9500 c.f.m. at ¾ in. total static pressure with refrigerant capacities from 34,000 to 356,000 B.t.u. per hr., using a 40F refrigerant.
MADE BY—*Marlo Coil Company, 6135 Manchester Ave., St. Louis, Mo.*

AIR CONDITIONING

Worthington Centrifugal Refrigeration Units

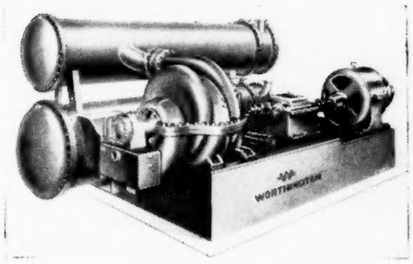
NAME—Centrifugal type refrigeration units.

PURPOSE—For air conditioning service.

FEATURES—This company is now offering a complete line of centrifugal refrigeration units for air conditioning service with capacities ranging from 150 to 650 tons. Speeds are said to be relatively low ranging from 4000 to 5400 r.p.m. and pressures are said to not exceed 15 lb. as a result of using Freon 11 as a refrigerant. A feature of these compressors is an auxiliary pump operating independent of the main drive for furnishing full pressure lubrication to all bearings during starting and stopping periods. In starting, the main power can be applied only after the auxiliary pump develops full pressure, and in stopping, the pump is automatically cut in as soon as the main power is shut off.

CAPACITIES—150 to 650 tons.

MADE BY—*Worthington Pump and Machinery Corporation, Harrison, N. J.*



Refrigerating capacities from 150 to 650 tons.

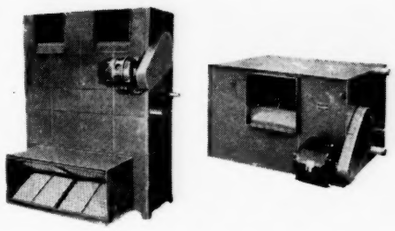
Kramer Air Conditioning Units

NAME—Kramer air conditioning units.

PURPOSE—For year 'round air conditioning.

FEATURES—Units are of the complete cabinet type furnished for either floor or ceiling mounting. The coils used in these units are of the Turbofin type of all copper construction with the fins bonded to the tubes by metallic fusion. The cabinet is made of heavy gauge steel with the cabinet of the larger units made in three or more sections to allow for portability and accessibility. Cabinets are lined with sound deadening and heat insulating material. Fans are of the centrifugal type, while the motors are rubber mounted outside the unit on an adjustable base. Filters are of the standard fibre-glass type.

SIZES AND CAPACITIES — Sizes range from 2 to 30 tons in cooling and



Two to thirty tons in cooling.

65,000 to 1,280,000 B.t.u. per hour in heating.

MADE BY—*Kramer Trenton Company, Trenton, N. J.*

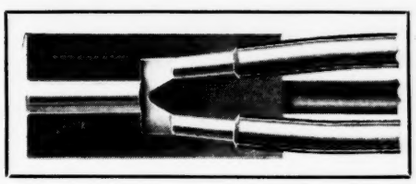
Spoehrer-Lange Refrigerant Distributors

NAME — Sporlan refrigerant distributor.

PURPOSE — For use on multi-circuit evaporators for evenly distributing liquid refrigerant to any number of circuits from 2 to 14.

FEATURES — These refrigerant distributors are to be used in conjunction with thermostatic expansion valves on multi-circuit evaporators. They are separate from the valves and can be applied to any standard evaporator in conjunction with any standard thermostatic expansion valves. They are available for any number of circuits from 2 to 14 and for connecting tubing from 3/16 to 5/8 in. OD. Distributor consists of a brass body or housing one end of which is recessed to receive interchangeable bushings or nozzles. This nozzle increases the velocity of the refrigerant to reduce the effect of gravity and to center the flow so that it impinges squarely in the center of a cone shaped button at the opposite end of the housing. Evenly spaced around the base of the button are the orifices into which the refrigerant is evenly distributed. The connecting tubes carry the distributed refrigerant to the several circuits of the evaporator. The capacity of the distributor is governed by the size of the nozzle. Distributors are available without any connecting tubing or with any length tubing specified.

MADE BY—*The Spoehrer-Lange Company, 3723 Commonwealth Ave., St. Louis, Mo.*



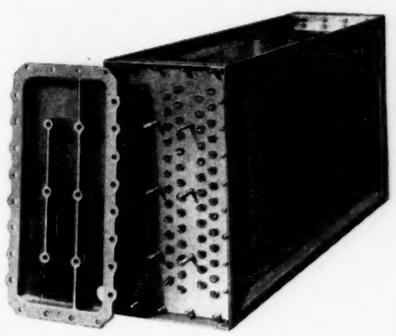
Reduces original and service costs.

Modine Cooling Coils

NAME—Cleanable and continuous tube cooling coils.

PURPOSE—For air conditioning using water as a cooling or heating medium.

FEATURES—The cleanable type coils are designed for use where cooling water conditions are such that cleaning of tubes will be necessary. The continuous tube type coils are designed for use where there is no possibility of dirt depositing on the inside of tubes to restrict water flow. Flow mixers are inserted in each tube of both coils to promote turbulence of the water as it flows through the tube. Various arrangements of water circulation are available without external piping connections and coils may be ordered with built-in provision for water counterflow for each single row of tubes or each double row of tubes. The cleanable type cooling coil is designed so that the entire header can be removed by taking off a number of hexagonal nuts which secure header to the casing. After the header is removed the flow mixers can be withdrawn and a wire brush can be inserted for the cleaning. Other features include: provision for expansion and contraction of the core, fins designed for directional air flow, and metallic bonding of fins to the tube.



Modine cleanable type coils.

SIZES AND CAPACITIES—Available with either cleanable or continuous tube types in 3 widths and 13 lengths, ranging from 2 ft. 8½ in. to 10 ft. 8½ in., and two depths, 4 rows and 6 rows of tubes.

MADE BY—*Modine Manufacturing Co., Racine, Wis.*

Weatherhead Packless Valve

NAME—Weatherhead packless valve.

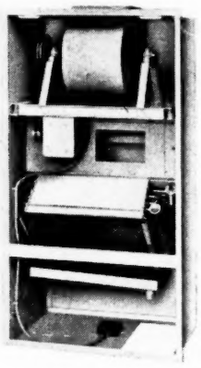
PURPOSE—For controlling the flow of refrigerants.

FEATURES—Features claimed include the following: low overall height, full capacity openings to provide a complete flow of refrigerant, fracture proof and leak proof construction using a beryllium copper diaphragm, and an oval grip handwheel for easy operation.

MADE BY — *The Weatherhead Co., Cleveland, Ohio.*

Webster-Nesbitt Conditioners

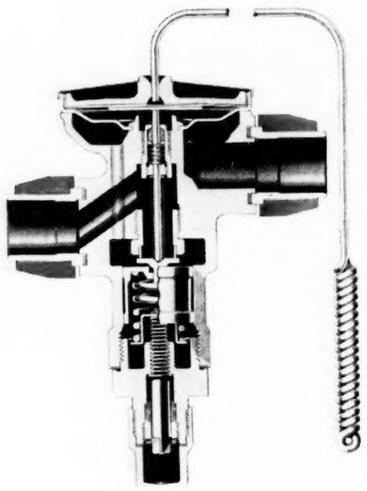
NAME AND MODEL NO.—Residential Air Conditioner, Series D, R and A.
PURPOSE — To meet the heating and air conditioning demands of present-day housing.
FEATURES — Series D is a compact, concealed unit for heating small apartments and multiple dwellings. It is available in three models with capacities from 300 to 600 c.f.m. standard air. Series R is for residence air conditioning — heating and air cleaning, or for winter heating and humidifying, air cleaning and summer cooling —with steam or forced hot water and chilled or well water. It is offered in eight models with capacities from 750 to 4000 c.f.m. Series A is for air conditioning of apartments and multiple residences and offers a compact, concealed installation. It is available in four models, with capacities from 350 to 1000 c.f.m. standard air.
MADE BY — *John J. Nesbitt, Inc., Holmesburg, Philadelphia, Pa., distributed by Warren Webster & Company, Camden, N. J.*



Webster-Nesbitt air conditioner series A.

Detroit Expansion Valves

NAME—Detroit Dura-Fram Automatic and Thermostatic Expansion Valves.
PURPOSE — For controlling the flow of refrigerant.
FEATURES—These valves are of single diaphragm construction with all joints silver-soldered and the diaphragm made of stainless steel. Needles and seats are made of a corrosion resisting alloy. Power elements on the thermostatic type valves are gas charged which is said to limit the suction pressure when starting up the system and to prevent overload to the motor and compressor.
SIZES AND CAPACITIES — Thermostatic expansion valve, No. 892, capacity of a half-ton on Freon or sulphur dioxide, 9/10 of a ton on methyl chloride at 60 lb. pressure drop. No. 895, one ton on Freon or sulphur dioxide,

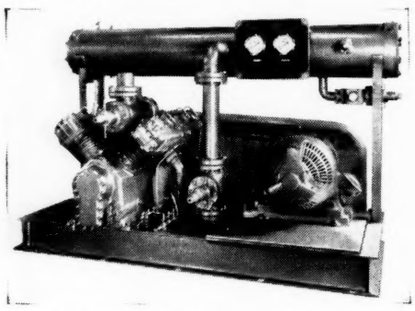


Capacity 12- to 20-ton with Freon.

1.8 ton on methyl chloride at 60 lb. pressure drop. Thermostatic expansion valve, No. 893, adjustable type, half-ton on Freon; No. 897, adjustable type, one ton on Freon. No. 894, non-adjustable, half-ton on Freon. No. 896, adjustable, one ton on Freon.. Nos. 786, 787 and 788 are for air conditioning applications and are rated from 3 to 20 tons on Freon.
MADE BY — *Detroit Lubricator Company, 5900 Trumbull Ave., Detroit, Mich.*

Carbondale Refrigeration

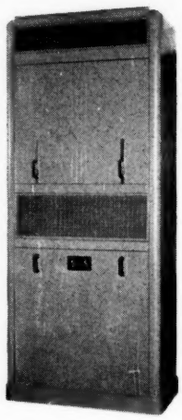
NAME—V type refrigerator.
PURPOSE—For compressing refrigerant for air conditioning applications.
FEATURES—This unit utilizes a new 8 cylinder, V-type compressor designed for Freon 12 refrigerant. Manufacturer states that these units are compact, light in weight and provide a large capacity where floor space or head room is limited. They are built with either V belt or direct motor drive and can be supplied with either a horizontal shell and tube type condenser mounted on the unit or without the condenser for use with a Worthington-Carbondale Shower condenser.
CAPACITIES—From 75 to 125 tons for single unit and up to 250 for duplex arrangements.
MADE BY—*Worthington Pump and Machinery Corporation, Carbondale Division, Harrison, N. J.*



An 8-cylinder V-type compressor.

Richmond Engineering Water Chiller

NAME—RECO Freon dry expansion water chiller.
PURPOSE—For cooling water using direct expanded Freon.
FEATURE—Manufacturer states that the outstanding feature of this water chiller is the method of passing the Freon through the coils. On entering the chiller, the Freon liquid vapor and oil are thoroughly mixed to assure an even feed to each tube and to obtain a uniform transfer of heat through each tube. The mixture is given a whirling action to increase the heat transfer and to assure an even feed of Freon to the tubes. After passing through the first series of tubes, a baffle is employed to keep the area of the Freon passage the same as the area of the first row of tubes. This is said to result in a definite check against oil trapping in the Freon head. The number of tubes in the second pass is increased to maintain a constant velocity since the Freon is considerably expanded by the time it reaches these tubes.
CAPACITIES AVAILABLE—5 to 200 tons.
MADE BY — *Richmond Engineering Company, Inc., Seventh and Hospital Streets, Richmond, Va.*



3 and 5 ton air conditioning units.

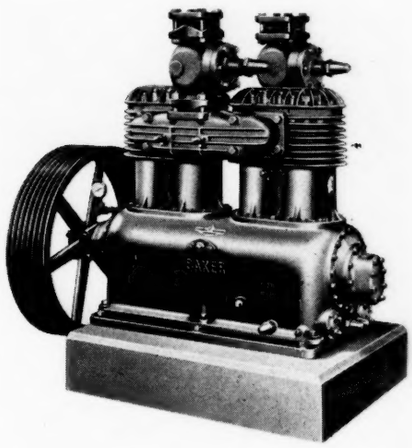
Peerless Air Conditioning Units

NAME—Peerless self-contained units.
PURPOSE — For summer air conditioning.
FEATURES — These units are complete except for compressor, motor and drive. They are equipped with large and removable panels which permit easy access to the interior. An ozonator is provided to purify the circulated air. Units are designed to take any 3 and 5 hp. compressor.
SIZES AND CAPACITIES—Two sizes —3 and 5 tons.
MADE BY—*Peerless of America, Inc., 515 West 35 St., Chicago, Ill.*

AIR CONDITIONING

Baker Freon Compressor

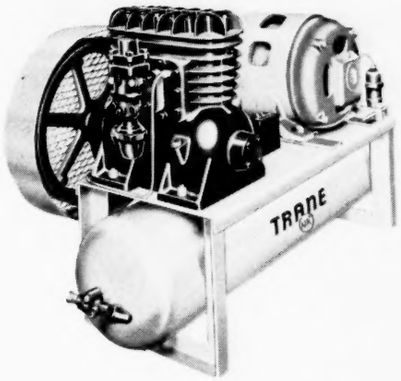
NAME AND MODEL NUMBER—Baker Freon Compressor, Model F 15BA.
PURPOSE — For compressing Freon refrigerant.
FEATURES—Semi-steel cylinders are precision bored and hone finished with cooling fin cast integral. Double trunk type pistons are semi-steel, full skirt, precision ground. Five rings per piston are provided including one oil wiping ring. Multiple anti-friction roller bearings of heavy duty type are provided on both the drive end and the blind end of the main bearing. The crankshaft seal is of a balanced bellows type. Crankshaft main connecting rod bearings and piston pins are under full pressure lubrication from built-in, positive drive, large capacity, high pressure, gear type oil pumps. Discharge valves are of full opening, multiple disc type made of stainless steel while the suction valves are of the large area, low lift spring type. The drive is of the multiple V-belt type.
MADE BY—*Baker Ice Machine Company, Inc., 1529 Evans St., Omaha, Nebraska.*



Equipped with roller bearings.

Trane Reciprocating Compressors

NAME—Trane reciprocating compressors.
PURPOSE—For supplying the refrigerating needs of air conditioning systems.
FEATURES—This line of compressors has capacities from 3 to 50 tons. The 3-ton unit utilizes 2 cylinders while the 5 to 25 ton uses 3 cylinders, and the 30, 40 and 50 consist of two compressors with 3 cylinders each. Crank case and cylinder body are built in one piece while the housing cover is dowel-located to the body to make the main bearing self-aligning. Compressors are equipped with strainer and oil separator, oil sight glass, and asbestos composition gaskets with Duprene bindings. All compressors are

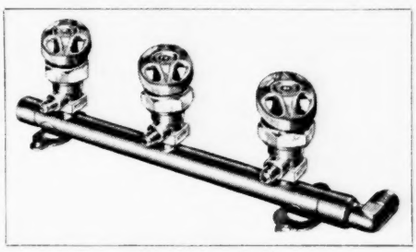


Trane reciprocating compressor with condenser.

available in 2 models, one with a condenser tank in addition to the compressor, for use in locations where condenser water is available at low cost, and another with compressor mounted on a sturdy base without refrigerant condensing facilities. This unit is adapted for use with a Trane evaporative condenser where water costs are high.
SIZES AND CAPACITIES — From 3 to 50 tons.
MADE BY—*Trane Company, La Crosse, Wis.*

Henry Packless-Valve Manifold

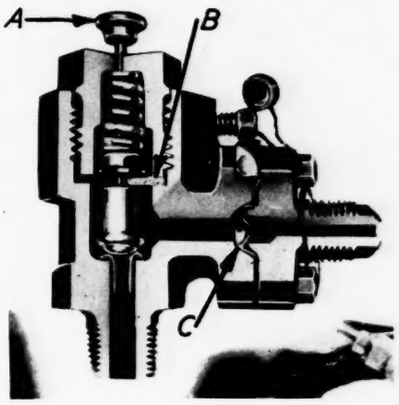
NAME — Henry packless-valve manifold.
PURPOSE—For the distribution and control of the flow of refrigerant.
FEATURES — Manifold serves threefold purposes: (1) a compact and convenient means of mounting shut-off valves, (2) more even distribution of refrigerant through valves and lines and, (3) centralized manual control location. These manifolds feature the use of Henry balanced action diaphragm packless valves which are said to be positive opening under all pressures and conditions. The angle valves are mounted on the manifold with extruded reinforced silver soldered joints. Manifolds are made with from 2 to 6 valves with either flare or solder connections.
SIZES—From ¼ to ⅝ in. SAE flare, or OD solder. Sizes of elbow manifold connection range from ⅜ in. SAE flare to 1⅜ in. OD solder.
MADE BY — *Henry Valve Company, 1019 N. Spaulding Ave., Chicago, Ill.*



Henry manifolds.

Black-Sivalls & Bryson Refrigerant Relief Valve

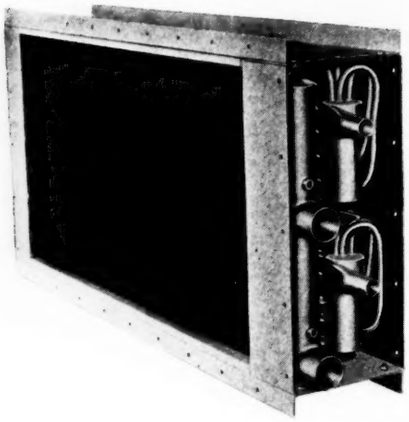
NAME—Safety head relief valve.
PURPOSE—For preventing dangerous over-pressures in refrigerating systems.
FEATURES — After the unit is installed on a pressure system, a slight lift on button (A) opens a relief valve which is then held open by gas pressure on the actuating diaphragm (B) until rupture disc (C) is burst by emergency over-pressure. Bursting of the rupture member by over-pressure removes the pressure from the actuating diaphragm (B) and the valve becomes an ordinary spring pop valve, closing when the emergency is past and pressure has dropped to normal. The spring relief valve then holds the gas in the system with a minimum of leakage, and a new rupture disc may be installed at the operator's convenience without shutting down the equipment.
MADE BY—*Black-Sivalls & Bryson, Inc., Kansas City, Mo.*



For preventing over pressures on refrigeration.

Nesbitt Cooling Surface

NAME—Nesbitt Series W Water Surface.
PURPOSE—For air cooling and cooling and dehumidifying with cold water or for air heating with hot water.
FEATURES—This is a fin and tube type surface which makes use of copper tubes and plate-type aluminum fins. Headers are of extruded copper tubing, with copper return bends and with all joints silver brazed. The counterflow principle of water circuiting is employed in all sections, and three water circuiting arrangements are provided. Sections are encased, free-floating, in galvanized casings, and are available in dimensions ranging from one to eight rows of tubes deep, in fin widths from 8.4 in. to 36 in. 16 finned lengths of 12 to 120 in. and three varieties of fin spacings.
MADE BY — *John J. Nesbitt, Inc., Holmesburg, Philadelphia, Pa.*



Perfect refrigerant distribution at all loads.

Young Evaporators

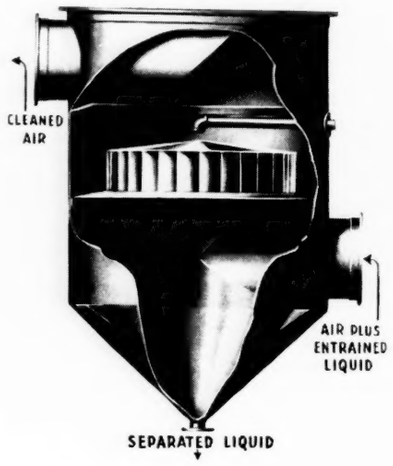
NAME—Young evaporator coils.
PURPOSE—For cooling air by direct expansion of refrigerant.
FEATURES—It is said that this line of evaporator coils is designed especially for cooling use and that the tube size, tube spacing and fin surface have been all selected from the cooling standpoint. One of the main features of this coil is a special refrigerant distributor which is designed to distribute the mixture of liquid and gaseous refrigerant evenly. In doing this the two fluids are separated, distributed separately and finally mixed. Manufacturer states that this procedure results in a substantially equal superheat in all passes of the coil even under a wide range of loads. It is also claimed that since these coils are designed specially for cooling, the moisture given up by the air runs down the fins to the drain pan and makes moisture eliminators unnecessary except at very high velocities.
MADE BY—*Young Radiator Company, Racine, Wis.*

Russell Ozone Generator

NAME—Ozonator.
PURPOSE—For introducing ozone into room air.
FEATURES—This device is a small cylindrical unit which produces ozone by electrical discharge and is designed to be attached to the upright member of a circulating fan or fastened to a wall. Capacity is 40 cubic centimeters of ozone per hour. The housing is made of metal, chromium plated, and unit is equipped with a 10 ft. rubber covered cord ready to be plugged into any standard 110 volt AC circuit. Ozonator is 6 in. x 3¼ in. in diameter, weighs 3½ lb. and is said to have a current consumption of less than 10 watts.
MADE BY—*Russell Electric Company, 340 W. Huron St., Chicago, Ill.*

Schneible Entrainment Separator

NAME—Schneible Entrainment Separator.
PURPOSE—For recovering air borne liquids.
FEATURES—Manufacturer claims effective removal of atomized or entrained liquids arising from various processes or operations and drawn into a ventilating system. The separator is designed to remove free moisture from air ventilating—washing processes, pickling processes, plating processes and to extract oils, lacquers, solvents, coatings and other sprayed materials from ventilating air, to free conditioned air of excess moisture after washing and cooling, and for other vapor entrainment purposes. In operation, the unit is connected into the air intake duct so that air with its burden of liquid is passed through the unit. Air or gas entering the unit is rotated, separating larger liquid particles, and then passes through the turbine-like vanes to increase the centrifugal action and impingement growth of minute liquid particles. An anti-creep ring prevents creeping of oil and like liquids; the clean air passing on and out into the duct. Separated liquid drips down into a hopper at the bottom of the unit, from where it is drawn off for re-use, salvage or disposal. Often the bottom is connected to a sewer. The impingement unit can be flushed occasionally by means of a water or other liquid introduced just above the conical impingement plate section. Flushing liquid can be drawn off and salvaged or piped to a sewerage system or otherwise wasted so that it will not contaminate the recovered liquids.
MADE BY—*Claude B. Schneible Company, Chicago, Ill.*



Removes liquids from air.

For returning oil in refrigerant systems.

Acme Oil Separator

NAME—Acme oil separator.
PURPOSE—For separating oil from the refrigerant.
FEATURES—Separator is designed to be placed in the discharge line between the compressor and the condenser. The oil laden entering gas is distributed by a spiral guide inside a perforated tube and forced through a filtering material which is said to cause a complete break up of the gas and oil and results in the oil falling into the bottom of the separator. An accumulation of oil raises a float valve permitting the return of the oil to the compressor crankcase. The shell of the oil separator is made of pressed seamless steel with float valve assembly and bottom welded to the shell or flanged according to the model.
SIZES AND CAPACITIES—Five sizes with capacities ranging up to 50 hp.
MADE BY—*Acme Industries, Inc., Jackson, Mich.*

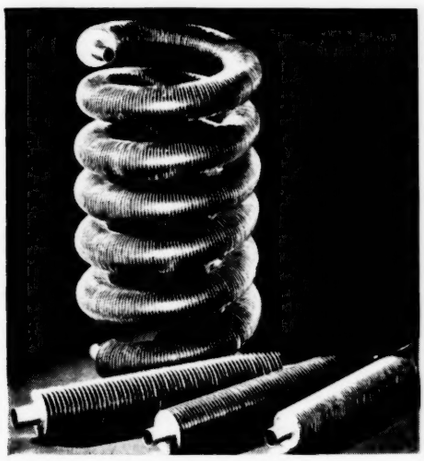
Standard Stoker Corporation Air Conditioning Unit

NAME—Standard Conditioneer.
PURPOSE—For room cooling.
FEATURES—These units are said to be designed so as to obtain the maximum capacity available contingent with efficient condensing unit motor operation. Unit is said to clean, dehumidify, cool, and circulate air. It is housed in a metal cabinet covered with a burnt mahogany leatherette. Floor models are provided with thermostatic control and room air exhaust.
SIZES AND CAPACITIES—Two window units, 1/3 and 1/2 hp.; two floor units, 1/2 and 3/4 hp.
MADE BY—*Standard Stoker Corp., Inc., New Albany, Ind.*

AIR CONDITIONING

Chase Extended Surface Tube

NAME—Chase Spiral-fin copper tube.
PURPOSE — For use in heating or cooling applications.
FEATURES — This tube is made in many sizes and fins come in varying heights, gauges and spacing. It is said that the spiral fins are cut in continuous lengths from thick wall tubing and each fin is smooth and flat. The fins are reinforced at the tube contact by two wires that are wound around the tube at the base and on both sides of each fin. By varying the height and spacing of the fins, the ratio of primary to secondary surfaces can be adjusted to best suit operating conditions.
SPECIFICATIONS—Tube sizes from ½ to 1¼ in. O.D. Fin heights from ¼ to ⅞ in. Fin thicknesses .008 to

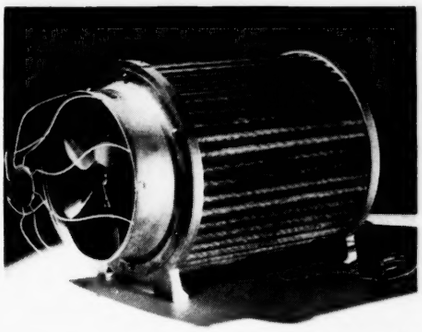


Chase spiral-fin tube.

.020 in. Maximum tube diameter including fin, 2¼ in. Fin spacing, 4, 5, 6, 7 or 8 to each inch of tube. Fins either all tin-coated or plain copper with soldered joint.
MADE BY—*Chase Brass & Copper Co., Waterbury, Conn.*

Connor Odor Adsorber

NAME—Dorex odor adsorber.
PURPOSE—An adsorber for removing unpleasant odors, gases, vapors, smoke and fumes from places of human occupancy.
FEATURES — These odor adsorbers are available in two types, one, a portable unit and the other for installation in duct systems. Both units employ as an adsorption medium specially processed, highly activated, granular, coconut shell carbon. Manufacturer states that this activated carbon will hold more than 20% of its own weight of odors. Under normal conditions it is said to keep its high efficiency during several years of operation after which it may be reactivated. The portable unit which is known as the



Portable odor adsorber.

Squirrel cage type may be connected to any 110 volt electric outlet and has only one moving part, the electric motor which drives a small fan. The activated carbon in this unit is held inside a cylindrical shaped cage of closely spaced perforated metal cylinders. The unit which is designed to use in ventilating systems is installed in the air circulating system in the same manner as an ordinary dust filter.
MADE BY—*W. B. Connor Engineering Corp., Dorex Division, 114 East 32 St., New York, N. Y.*

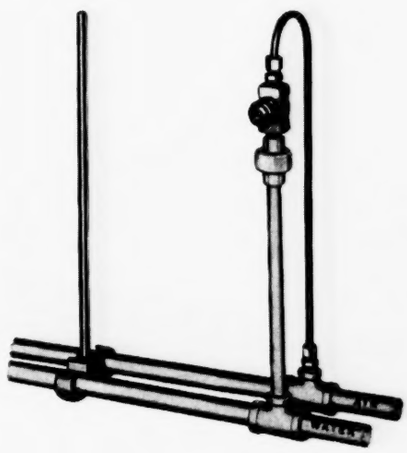
Fedders Superheat Thermometer

NAME — Clip-on superheat thermometer.
PURPOSE—For checking superheat of direct expansion air conditioning coils at suction end of each circuit.
FEATURES—Thermometer is said to make it possible to accurately check superheat of direct expansion air conditioning coils at suction end of each circuit of coil and is intended for use in the setting of Fedders individual flow-control valves. It is also possible to check the temperature of the high pressure liquid entering the expansion valve. Inlet and outlet water circulating through air conditioning coils can also be checked.
LITERATURE AVAILABLE—Bulletin 392-A.
MADE BY — *Fedders Manufacturing Co., Buffalo, N. Y.*

For checking superheat.

Spraying Systems Humidifying Nozzle

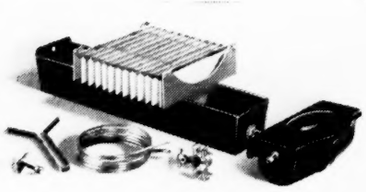
NAME—Humidifying nozzle.
PURPOSE — For adding moisture to air.
FEATURES — A group of these nozzles are mounted at the ceiling level with the water level maintained slightly below the nozzle levels by means of a float controlled tank. Compressed air is controlled by a solenoid operated valve actuated by a humidistat. Manufacturer states that the system is foolproof and cannot drip for when the air supply is shut off water will drop back to the controlled level.
MADE BY — *Spraying Systems Co., 4021 W. Lake St., Chicago, Ill.*



For adding moisture to air.

Armstrong Unit Humidifier

NAME AND MODEL NO.—Unit humidifier type K-2A.
PURPOSE—For adding moisture to air.
FEATURES—Unit uses steam taken directly from a low pressure line (1 to 15 lbs. per sq. in.) or from a high pressure line through a reducing valve. Steam enters an outer jacket of the unit and is bled under the control of a solenoid valve into an inner chamber. From this chamber the steam flows to the atmosphere. A small electric fan mounted near the outlet helps spread the moisture through the surrounding space. Control is through a Friez humidistat connected to the solenoid valve. Capacity varies with the steam pressure used. With 7 lb. pressure manufacturer states that 43 lbs. of moisture per hr. can be added to the surrounding air without precipitation if the existing humidity is low and normal room temperatures maintained.
MADE BY — *Armstrong Machine Works, 846 Maple St., Three Rivers, Mich.*



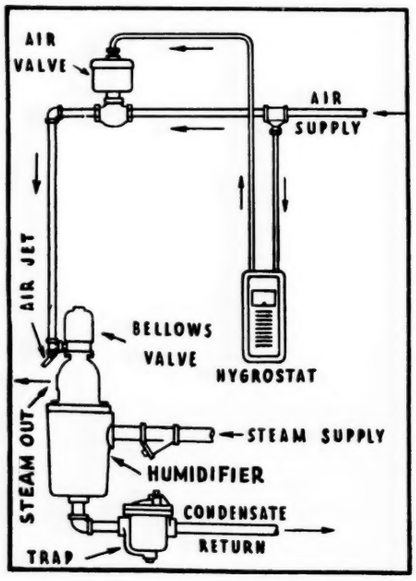
For adding moisture to air.

Viking Humidifier

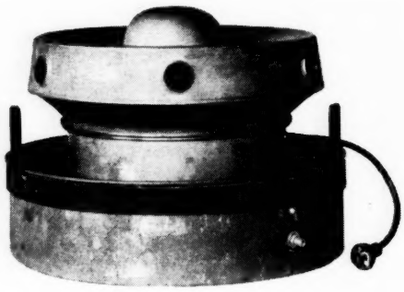
NAME—Viking humidifier, series 1100.
PURPOSE—For installation in warm air heating systems for adding moisture to air.
FEATURES—Humidifier consists of two separate units—an evaporating pan and a float chamber which contains the Viking Top-seat float valve assembly. Float tank is located outside the furnace so that all the working parts are accessible and free from heat, mineral deposits and corrosion. The evaporating pan is protected by two coats of acid resisting porcelain enamel and can be installed in either a warm air plenum chamber or ducts. Twelve Pyroxene evaporator plates are suspended from a copper rack to provide an evaporating surface of 480 square inches.
MADE BY—*Viking Air Conditioning Corporation, 9500 Richmond Ave., S.E., Cleveland, Ohio.*

Armstrong Humidifier

NAME — Air operated steam type humidifier.
PURPOSE—For installation in locations where electric circuits are undesirable.
FEATURES—Because this humidifier uses no electricity in its operation it is believed that the unit will have considerable field of use in chemical and processing plants, munitions plants, milling plants and hospitals where explosive hazards exist. The assembly includes a pneumatic hygrostat which acts as a pilot valve to admit pressure to the diaphragm chamber of the main air valve when the relative humidity drops below the desired percentage. Opening of the main air valve allows compressed air to flow to the humidifier when the pressure builds up and opens a steam valve in the top of the humidifier. The steam valve admits steam to a special silencing chamber in the humidifier from whence it escapes directly to the atmosphere to add humidity to the room. Circulation and distribution of the steam is facilitated by allowing a small amount of compressed air to go to a blow nozzle directly above the steam outlet. Compressed air for the humidifier may be at any pressure from 20 to 100 lb. or less. Unit is said to have a maximum capacity for adding moisture to air at the rate of 44 lb. per hour.
MADE BY—*Armstrong Machine Works, 846 Maple St., Three Rivers, Mich.*



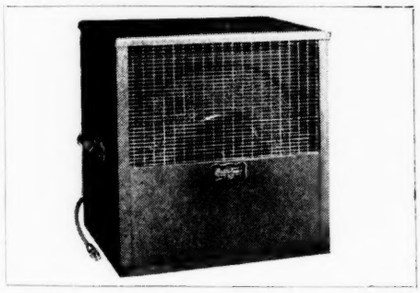
For humidifying rooms in which explosive vapors might be present.



For industrial dehumidification.

Walton Industrial Humidifier

NAME—Walton industrial humidifier.
PURPOSE—For adding moisture to air in industrial buildings.
FEATURES—Humidifier is furnished complete ready for installation and requires only a connection to a water main and to an electric socket. Unit uses no heating coils and is equipped with an atomizing unit driven by an electric motor drawing approximately 100 watts. Tank is of heavy gage copper, 18 in. diameter and equipped with an adjustable float valve and overflow outlet complete with hanging brackets. Vapor is discharged horizontally through six flared holes and the unit is said to evaporize approximately 1 gal. per hr. Overall dimensions are 18 in. diameter, 14 in. high.
MADE BY—*Walton Laboratories Inc., 1186 Grove St., Irvington, N. J.*



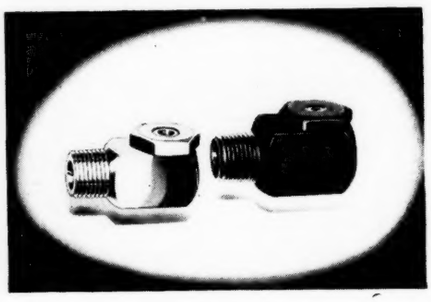
Model 341 Humidome.

Alter Humidifiers

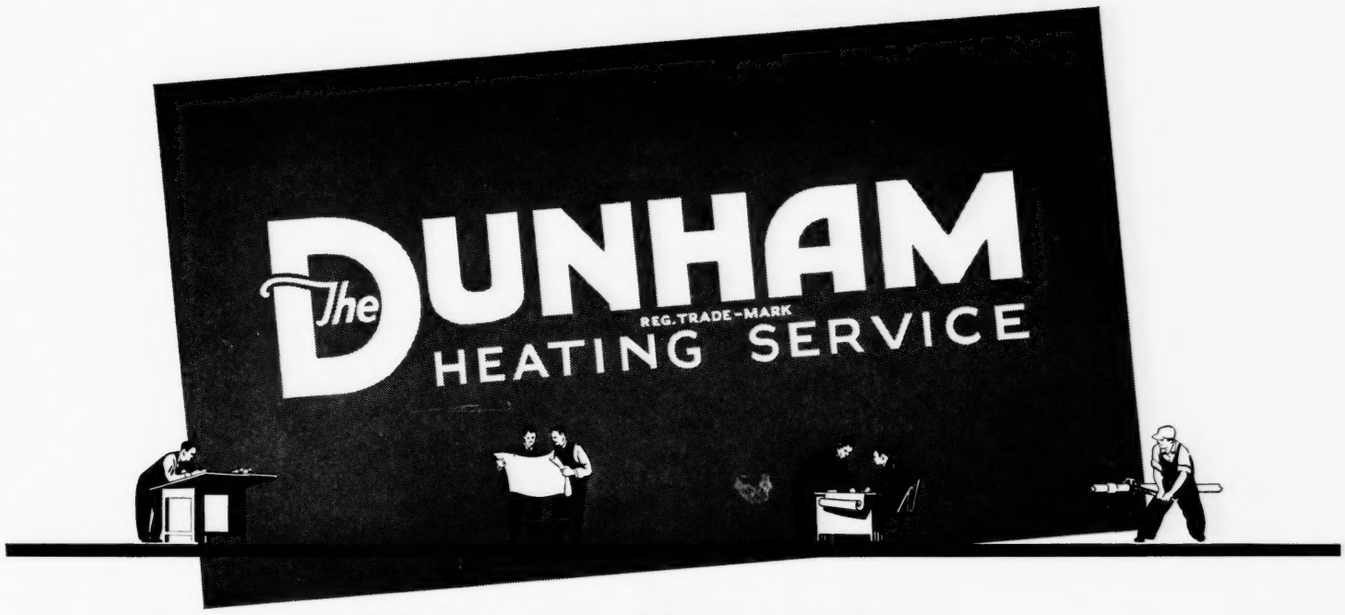
NAME—Humidome humidifiers.
PURPOSE—For adding moisture to the air.
FEATURES—1941 line of Humidome humidifiers consists of three models, with humidifying capacities ranging from 3 to over 4 pints per hour. All of these units utilize a "Miracle Drum" which slowly revolves through water in the reservoir and is said to expose over 30 sq. ft. of evaporative surface to the air stream. Units have a reserve capacity of 5 gal. Manufacturer also states that these units will remove a considerable amount of dust and dirt from the air.
MADE BY—*The Harry Alter Company, 1728 So. Michigan Ave., Chicago, Ill.*

Spraying Systems Nozzle

NAME—Flat Spray nozzle.
PURPOSE—For use in applications requiring a flat spray with heavy center.
FEATURES—Nozzles are for metal cleaning and processing, industrial washing machines, or for air conditioning applications. Spray is of the flat type with slightly heavy center and can be had in a number of different spray angles. Standard stock construction is of brass or iron, although other materials can be specified.
SIZES AND CAPACITIES—¼-in. male pipe connection with capacities of 0.5 to 3.5 gal. per min. at 10 lb. pressure and 3 to 7 gal. per min. at 40 lb. pressure.
MADE BY—*Spraying Systems Co., 4021 W. Lake St., Chicago, Ill.*



For spraying corrosive fluids.



MAKING HEATING SERVE YOU *Better*

NO matter where you fit in the heating picture, whether as Consulting Engineer, Architect, or Heating Contractor, *there is a personal advantage for you* in "Dunham Heating Service."

That advantage places at your command the accumulated experience of almost forty years of single-track work in heating research, heating engineering, heating invention, and—heating system installation in every possible type of building under every kind of circumstance.

The delivery of Good Heating, rather than the mere sale of heating accessories, has been and still is our objective.

That advantage, "Dunham Heating Service," works with you to help you deliver—in pride—with profit, the single important commodity—Good Heating.

DUNHAM *has made* HEATING SERVE YOU BETTER *since* 1903

"Dunham Heating Service" is available through the telephone in more than 60 cities, or by correspondence to C. A. Dunham Company, 450 East Ohio Street, Chicago.

DUNHAM *Sub atmospheric Steam* HEATING

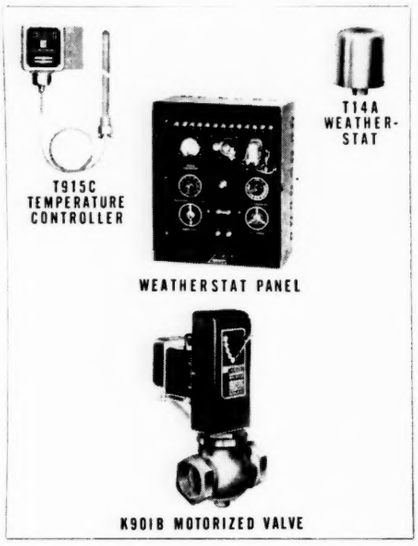
Remote bulb Econostat.

Barber-Colman Econostat

NAME—Remote bulb Econostat.
PURPOSE—For regulating heating systems in apartments, offices, hotels, factories and similar buildings.
FEATURES—This control is designed for those installations which cannot be satisfactorily controlled from a single thermostat. It regulates the heating directly from the outdoor temperature by supplying the heat at intervals. In operation it is said to maintain the indoor temperature by varying the "heat-on" periods in accordance with outdoor temperature changes. Thus, it is said the heat supplied to the building is in proportion to the heat loss and is not dependent on the temperature in any particular room. It is said that this control can be installed in either new or existing buildings and will control any type of heating system whether it be oil-, gas- or stoker-fired, or central steam system.
MADE BY — *Barber-Colman Company, Rockford, Ill.*

M-H Zone Control System

NAME—Minneapolis - Honeywell Modulating Weatherstat zone control system.
PURPOSE—For controlling the operation of two-pipe steam heating systems.
FEATURES—The system employs the T14A Weatherstat as its master controller. This device is mounted on the outside of the building on the outer wall of the zone it is to control and functions like a miniature building in that it has its own thermostat and heating plant, the latter in the form of an electric heating coil. Manufacturer states that one of the outstanding features of this system is that it provides for the continuous flow of steam during lower outdoor temperatures and for two-position operation of the modulating motorized valve during higher outdoor temperatures. The fact that the zone valve is operated in a two-position manner during outdoor temperatures that require very little steam is said to eliminate distribution difficulties encountered by most modulating systems in mild outside temperatures. This system is applicable to two-pipe steam heating systems only and is recommended for installations where a constant source of steam is available and where a motorized steam valve can be installed. All radiators must be properly orificed and a relatively constant pressure differential must be maintained between the supply side of the motorized valve and the system return.
MADE BY — *Minneapolis - Honeywell Regulator Co., 2950 Fourth Ave., South, Minneapolis, Minn.*



Controls two-pipe steam heating systems.

White-Rodgers Thermostat

NAME—Line voltage thermostat, type 176.
PURPOSE—For regulating room temperatures.
FEATURES—This thermostat incorporates an adjustable stop to limit the maximum temperatures at which it may be set. This maximum temperature may be adjusted only by removing the instrument from the wall. Manufacturer states that such a device makes it possible for the building owner to control the maximum room temperature. This thermostat also has a setting for summer operation which makes it possible to operate the fan on warm air systems during the summer without disturbing the winter temperature stop.
MADE BY—*White-Rodgers Electric Company, 1209 Cass Avenue, St. Louis, Mo.*

Spence temperature-controlled pressure regulator.

Spence Temperature Controlled Pressure Regulator

NAME — Spence Temperature Controlled Pressure Regulator.
PURPOSE—To regulate the pressure delivered to a heating unit and to shut off when a desired temperature is reached.
FEATURES — The advantages of the type of construction used in this valve are the low-cost, simplified construction, and the complete elimination of stuffing boxes. The illustration shows the Type-W weight loaded pilot designed for delivery pressures less than 10 lb. The unit can also be furnished with the Type-D spring-loaded pilot for higher pressures and can be operated by any type of thermostatic motor including an electric heat motor or a standard two-position electric motor.
MADE BY—*Spence Engineering Company, Inc., Walden, N. Y.*

Magnet Room Thermostat

NAME — Magnet Featherweight room thermostat No. 19.
PURPOSE — For controlling the temperature of room.
FEATURES—Manufacturer states that since this thermostat has a weight of only 1¾ oz. and that the thermostat is well ventilated, it will respond quickly to changes in temperature. It is further stated that the thermostatic bar is freely exposed to air passage and that there is a vertical ventilating air space and bakelite insulator between the thermostat and the wall. Thermostat is said to be accurate within 1F, to have a differential of 2F and a range from 60 to 80F. The action is magnetic—quick make and break.
MADE BY—*Magnet Switch Company, 356 W. Huron St., Chicago, Ill.*

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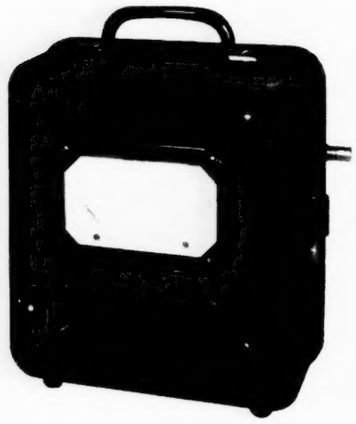


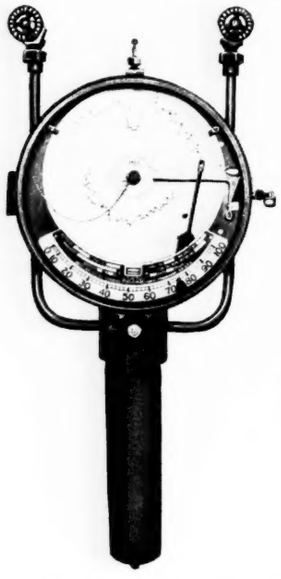
For measuring CO_2 and temperature.

Engelhard Flualyzer

NAME—Englehard Flualyzer.
PURPOSE—For measuring the temperature and amount of carbon dioxide in flue gases.
FEATURES—Instrument operates on the thermal conductivity principle of gas analysis. It is claimed that analysis can be obtained within a few seconds after the instrument is set up and its accuracy is within .2 to .3 of 1% against Orsat checks. Dryer is furnished with the unit so that the gas measured is dried before passing into the instrument.
MADE BY—*Charles Engelhard, Inc., 90 Chestnut St., Newark, N. J.*

ADSCO Flow Meter

NAME—ADSCO flow meter.
PURPOSE—For metering of steam, water, air or gas.
FEATURES—Instrument operates in conjunction with an orifice plate in the pipe line and records the flow on a large chart. All charts and counters show the flow directly and immediately. Meter is said to maintain its accuracy under the most severe conditions. Meter is offered in 4 types: (1) recording only, (2) recording and integrating, (3) indicating and recording and (4) indicating, recording and integrating. In addition, an auxiliary pressure recorder can be fitted to any model to record the working pressure on the same chart as the flow.
LITERATURE AVAILABLE—Bulletin 35-83.
MADE BY—*American District Steam Company, North Tonawanda, N. Y.*



For measuring steam, water, air or gas flow

Dwyer CO_2 Indicators

NAME AND MODEL NO.—Pocket CO_2 indicator, model 800.
PURPOSE—For indicating the amount of carbon dioxide in flue gases.
FEATURES—Unit is said to be compact in size and high in efficiency. The body of the instrument is made of crystal clear plastic material which is said to be unaffected by the absorbent solution used in the indicator. No glass is used and all passages are drilled and reamed in a solid block of the clear plastic. All metal parts that come in contact with the chemical solution are said to be stainless steel. Manufacturer states that the solution can not be spilled as the plunger and vent close automatically. Unit is furnished with a carrying case with a built-in compartment for the addition of a draft gage and flue gas thermometer. The complete unit is said to weigh 4 lb. and is furnished with all accessories, rubber tubing, aspirator bulb, terminal tube and operating instructions.
OPERATION—The gas sample to be tested is pumped into the indicator with a dozen strokes of the aspirator bulb while the plunger is held down. The absorbing unit is raised and lowered and the percentage of CO_2 is indicated immediately.
MADE BY—*F. W. Dwyer Manufacturing Co., 565 W. Washington Boulevard, Chicago, Ill.*

For rapid determination of CO_2

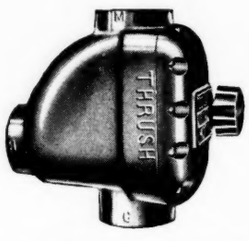
Industrial Humidistat.

Friez Insertion Humidity Control

NAME—Industrial insertion humidistat, type H61.
PURPOSE—For insertion in ducts or cabinets where dust, dirt, or other adverse service conditions would prevent satisfactory service of other types.
FEATURES—Control features the multiple human hair element and a switch mechanism, fully enclosed in a molded plastic case. Controls humidifying and dehumidifying over a range of 10 to 100 percent relative humidity within plus or minus 1 percent.
MADE BY—*Julien P. Friez & Sons, Div. of Bendix Aviation Corp., Baltimore, Md.*

Thrush Tempering Valve

NAME—Thrush tempering valve.
PURPOSE—For providing correct temperature domestic hot water.
FEATURES—Valve is said to be low in cost and thermostatically controlled. An external adjustment is provided so that the valve will supply any temperature water up to the temperature of the hot inlet water. The thermostatic element is located in the mixing chamber and is designed to immediately compensate for any changes in temperature. It is said to be not affected by variations in pressure. Entire thermostatic element can be removed without disconnecting the piping.
SIZES AND CAPACITIES—½, ¾, 1, 1¼, 1½ and 2 inches.
MADE BY—*H. A. Thrush & Company, Peru, Indiana.*



For providing correct temperature hot water.

The Story of RIC-WIL INSULATED PIPE UNITS Recorded In Pictures

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STRENGTH
SIMPLICITY
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REAL PIPE SUPPORT AND GUIDE SCREW INTO CONDUIT — REMOVABLE
PIPE AND ITS COVERING FREE FROM ANY LOAD ON THE CONDUIT
HEAVY ASPHALT SHELL IS OUTSIDE OF AND SUPPORTED BY STRONG ARMCO CONDUIT
CROSS SECTION
DURABLE WATERTIGHT ENGINEERING
RIC-WIL INSULATED PIPE UNITS
BUTT WELDED CONNECTION BETWEEN UNITS
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General Motors Co., Norwood, O.
Welding conduit. With this connection, plain ring pipe supports are used and Conduit is free to slip over pipe, insulation and supports.
Housing project, showing typical fittings.
Nemours Foundation Hospital, Longwood, Del., showing curved line.
Union College, Schenectady, N. Y.
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START. 160 ft. installed in 23 hrs.—a Rochester Gas & Electric Co. job. FINISH
Shallow trench is practical for Ric-wil Units.
Adequate strength under railroad tracks.
Connection with pre-fabricated manhole.
Ric-wil Units in production at factory.
Fittings for expansion and special shapes and bends are furnished as necessary.
Welding steam pipe.
Shaker Square Co., Cleveland wrapping joint before installing connector.
Units delivered on a typical housing job.
Installing connector sleeve.
50-ft. long Units for Ohio Edison Co., Akron, O.
Welded into a single piece 700 feet long, this pipe was dropped into the open trench beside which it lies, to become a link in the steam line by which the Ohio Edison Co. will furnish heat to the housing project in Elizabeth Park, Akron, Ohio.

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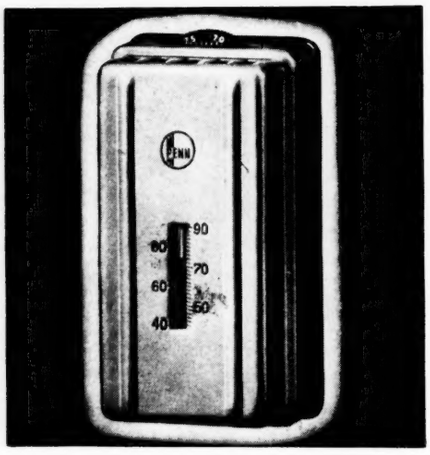
FOR UNDERGROUND OR OVERHEAD STEAM LINES

Penn Thermostat

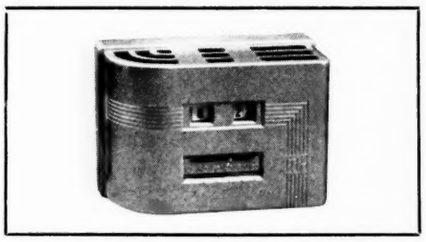
NAME—Penn Thermostat 870 Series.
PURPOSE—For controlling room temperature.
FEATURES—A two-wire, low voltage, heat anticipating or auxiliary heat actuated thermostat which replaces the company's former type 836 thermostat. The following advantages are claimed: a one-piece moulded bakelite base designed for three-point mounting; terminal set in recesses moulded into the base to eliminate possibility of shorting across the terminals; the use of a powerful, though small, Alnico magnet in the permanent magnet snap-acting contact; and a convenient sealed calibration adjustment. The thermostat is designed for use with all of Penn's small motor relays and primary controls for oil, gas, and stoker heating service. 870 Series also available for automatic day-nite control.
MADE BY—*Penn Electric Switch Co., Goshen, Ind.*



For comfort heating applications.

M-H Chronotherm

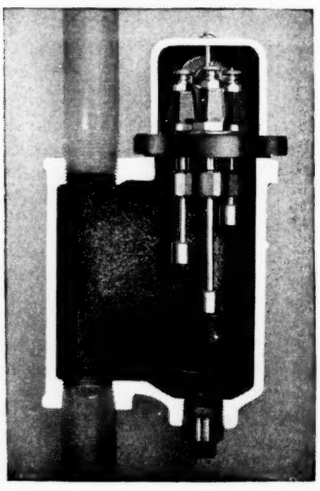
NAME—Minneapolis-Honeywell Chronotherm T 111.
PURPOSE—Thermostat operating under time control.
FEATURES — Thermostat combines automatic time control with all of the features of the heat accelerated series 10 thermostat, and it is designed to operate with any Minneapolis-Honeywell series 10 primary control. Unit is equipped with a self-starting electric clock to automatically lower the temperature of night and to automatically restore the normal temperature at any time during the day. Additional features include, self-starting clock of the latest numeral type; co-ordinated temperature indicator and thermometer in parallel arrangement for comparative reading; Da-nite time recycling permits manual setting of temperatures at any time with automatic return to the regular time cycle at the next automatic temperature change.
MADE BY — *Minneapolis-Honeywell Regulator Company, Minneapolis, Minn*



Combined thermostat and clock.

Johnson Boiler Water Controls

NAME—Boiler water controls, types E and S.
PURPOSE—For maintaining boiler water at a safe level by starting boiler feed pumps whenever the water level falls below a predetermined minimum.
FEATURES—Each of these models uses a motionless electrode control which is made up of two electrodes of different lengths suspended in a chamber which can be mounted right on the water glass column. When the boiler level falls below the longer electrode an electrical circuit is disturbed which through a relay starts the pumps in operation and keeps them pumping until the water in the boiler reaches the short electrode. Model E will start single phase electric motors as large as 1 hp. while for polyphase or larger single phase size motors it functions as a pilot circuit to operate a starter. Model S is used to control an electric steam supply valve.
MADE BY—*Johnson Corporation, Three Rivers, Mich.*



Electrode holder as used on Johnson water and boiler water controls.

Barber-Colman Heating Controls

NAME—Econostat.
PURPOSE—For regulating heating systems directly from outdoor temperatures.
FEATURES—Manufacturer states that the Econostat controls the heat supply in cycles by regulating the length of the "heat on" periods and varying them as the outdoor temperature changes. The "heat-on" periods are 100% at minimum outdoor temperatures, and are decreased proportionately to zero when the outdoor temperature rises to 70F. It is said that the Econostat is a complete control unit and requires no auxiliaries. It requires only mounting in a convenient proper location within the building with the sensitive element extending outdoors. It may be located on any floor or in the basement through a window panel. Unit can be arranged to operate zone valves or to operate the fuel firing device.
MADE BY—*Barber-Colman Company, Rockford, Ill.*

Outside temperature controls heating system.

Barber-Colman Motor Relay

NAME—Motorelay.
PURPOSE—For use in floating or proportioning control circuits of line voltage motors operating large dampers, large valves, voltage regulators and similar equipment.
FEATURES—The relay consists of a small reversible geared head, shaded pole Bar-col motor which tilts two mercury tubes. The tubes are arranged to give single pole, double throw operation with spring return to a neutral off position. It is said that the use of this relay permits throttling, floating or proportioning control of a 5-ampere load from a sensitive instrument having a current rating as low as 0.35 ampere. It is claimed that chattering is eliminated by the use of the motor relay because a momentary contact at the instrument is not sufficient to close the mercury tube switch.
MADE BY—*Barber-Colman Company, Rockford, Ill.*

Where "QUIET" is Essential

Careyduct

THE ALL-ASBESTOS *prefabricated* DUCT

FOR BETTER HEATING AND AIR CONDITIONING

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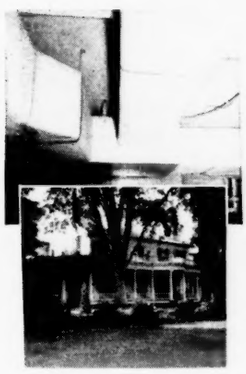

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Lakeville, Conn.

Careyduct is made entirely of asbestos combines *both* duct and insulation. Simple slip-joint construction and standardized parts make fitting on job easy and rapid. Cuts easily with saw; no shop work necessary.

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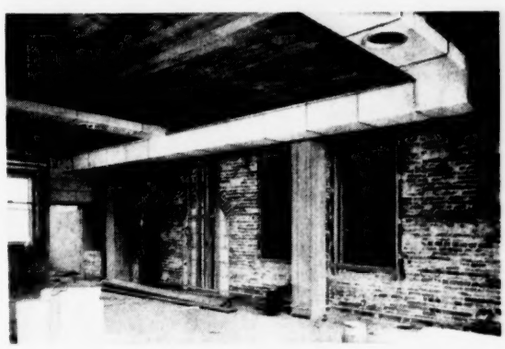
Careyduct is fireproof; can't rust or rot. Makes a smoother, better-looking, more efficient job. Size for size, it costs LESS than insulated metal duct.

Bring your duct work up to date—keep customers satisfied—make more money—with Careyduct. Write today for full details—address Dept. 49.



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Contractor: Schultz Steel Metal Co.

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3. Placing adhesive on board
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5. Wiring board before furring-in
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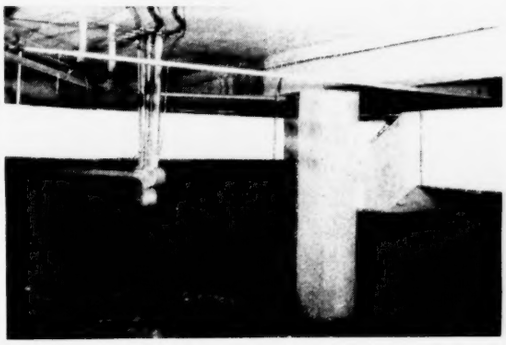

St. Louis Star-Times Publishing Co., St. Louis, Mo.
KXOK Broadcasting Transmitter.

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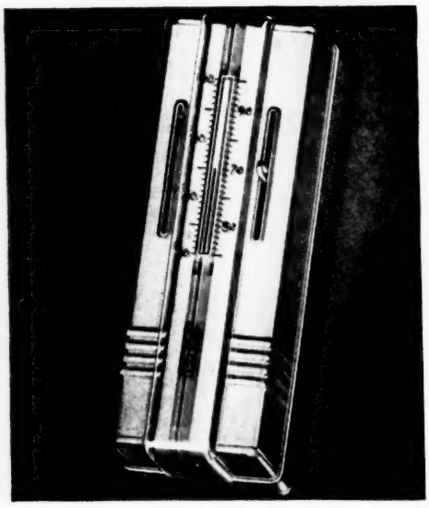


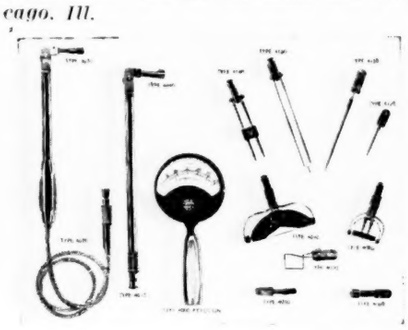
Made of transparent plastic.

Gleason-Avery Thermostat

NAME—Gleason-Avery thermostat.
PURPOSE—For controlling room temperatures.
FEATURES — Thermostat is designed for greater eye appeal and quicker and easier readability. It is said to be the first application of transparent plastic in the thermostat field. A single temperature scale is provided for both reading and setting with a finger tip adjustment. The lever is adjustable to the thermometer scale over 40F in temperature and is said to be sensitive to limits of 1F.
MADE BY — *Gleason-Avery, Inc., Auburn, N. Y.*

Illinois Surface Pyrometer

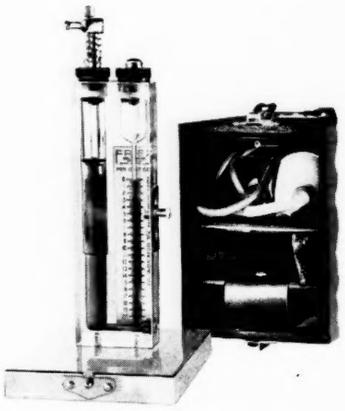
NAME—Alnor Surface Pyrocon, type 4000.
PURPOSE—A portable pyrometer for measuring surface temperatures.
FEATURES—Instrument incorporates a number of new features including the following: heavy rugged movement, choice of either rigid or flexible arms or both which are instantly removable or interchangeable, instant interchangeability of different thermocouples, choice of seven standard temperature ranges, and greater accuracy.
MADE BY—*Illinois Testing Laboratories, Inc., 420 N. La Salle St., Chicago, Ill.*



For measuring surface temperatures.

Friez CO_2 Indicator

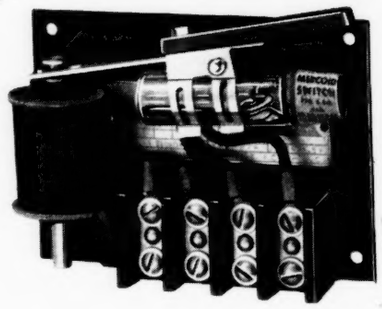
NAME—Friez CO_2 indicator, Model Y/2.
PURPOSE — For determining the amount of carbon dioxide in flue gases.
FEATURES—Instrument is machined from a solid block of clear plastic, while the metal parts are of stainless steel. The absorbent solution is brilliant red in color and its level is reflected from the polished scale to allow the operator to line up the liquid level, its reflection and the scale graduations thus preventing any parallax. Instrument is said to be accurate to within ½ of 1%. Readings are taken by zeroing the scale, pumping a sample of gas into the chamber, and raising and lowering the absorption basket. Indicator is supplied complete with a carrying case in which space is provided for stack thermometer and full size draft gauge.
MADE BY—*Julien P. Friez & Sons, Division of Bendix Aviation Corporation, Baltimore, Md.*



For indicating carbon dioxide in flue gases.

Mercoid Relay

NAME—Mercoid relay, type W-6.
PURPOSE—For the control of motors, valves, electrical heaters and similar equipment.
FEATURES—Relay is designed for panel mounting and is recommended for many industrial applications. In operation a plunger type solenoid is used to actuate a tilting arm to which the Mercoid hermetically sealed mercury contact switch is attached. When the coil is energized, the plunger floats within the plunger guide tube which is said to reduce the noise of the alternating current vibrations. There are no metal contacting armature faces. Opening of the pilot circuit or current failure causes plunger to drop by gravity and it is claimed that the contact can not be held closed by residual magnetism. Available for any voltage



Mercoid relay, type W-6.

or cycle between 6 volts and 230 volts, A.C. or D.C.
MADE BY—*The Mercoid Corporation, 4203 Belmont Ave., Chicago, Ill.*

Hays Air Filter Gage

NAME—Hays air-filter gage, series B.
PURPOSE—For indicating static pressure drop across filters.
FEATURES—Gage is designed to be connected to static tips installed in the duct on opposite sides of the filter bank. The difference in static pressure between the two tips is indicated by the gage. The gage may be furnished with electric contacts so as to flash or sound an alarm when resistance becomes excessive, or to operate a damper to control the flow of air through the ducts. Standard scale ranges are .3, .5, 1, 1.5, 2 and 5 in. water. Special ranges also available. Gages available for wall or flush panel mounting.
MADE BY — *The Hays Corporation, Michigan City, Indiana.*

For indicating air filter resistance.

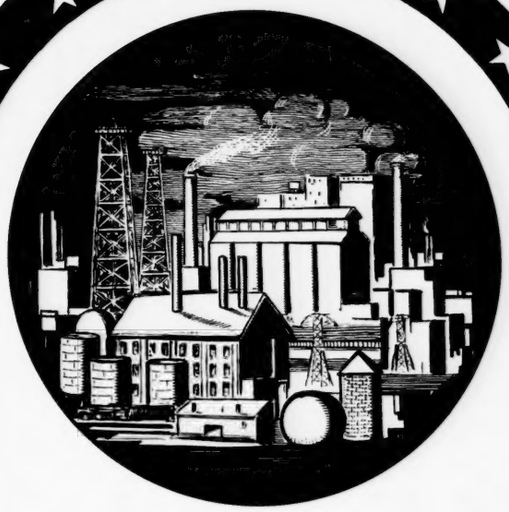
Mercoid Sensatherm, a low voltage thermostat used with all types of automatic heating, air conditioning, refrigeration, etc.

Explosion-Proof Thermostat for industrial room air temperature control in hazardous locations.

Lever Arm Control used to mechanically open and close electric circuits. Adaptable to many kinds of applications.

Pressure Control used as a safety limiting device on steam boilers. Also widely used on many industrial applications.

Pressure Control within explosion-proof case for use in oil refineries, gasoline stations, flour mills, etc.



SAFETY

IS INDUSTRY'S FIRST LINE OF DEFENSE

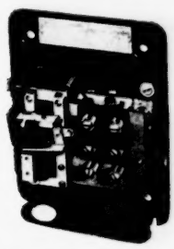
U. S. Government defense measures are now in full stride. American industry is called upon to meet urgent requirements. Production facilities are going to be taxed to capacity. ¶ Gearing up to a high speed, calls for extra precautions all the way down the line. Here is where Mercoid Automatic Controls play an important role. They stand at guard, offering unfailing protection wherever their services are required. They are standard for all types of industrial applications. ¶ Pressure, vacuum, temperature, liquid level, mechanical operations, electrically operated under Mercoid Controls represent the ultimate in safety. ¶ There are many industrial conditions where explosion-proof control operation precautions are essential. Wherever such conditions prevail, Mercoid Controls in explosion-proof housings are recommended. They are available for various types of control applications. These controls are one of Mercoid's many outstanding contributions to the field of industrial control. ¶ All Mercoid Controls are equipped exclusively with corrosion-proof sealed mercury contact switches, assuring uninterrupted performance and long life. Manufacturers requiring high grade mercury switches will find the Mercoid line measuring up to every exacting requirement. ¶ Consider Mercoid a consultant on any of your control or switch problems. A competent staff of engineers are at your service. ¶ Send for comprehensive Mercoid Catalog, it will prove a valuable addition to your source library.

THE MERCOID CORPORATION

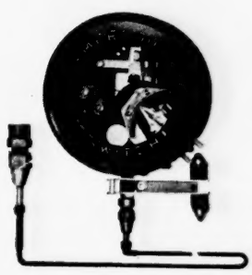
4202 BELMONT AVENUE • CHICAGO, ILLINOIS

Various types of mercury switches available. Illustration above shows the Magnetic stationary type, mercury switch. Permanent magnet actuates electrode to "open" or "close" the circuit.

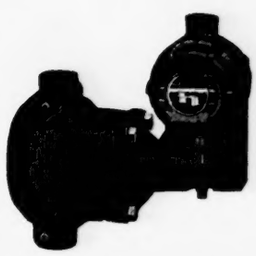
Tilting type mercury switch. The internal construction produces a snap-action movement of the mercury, causing a quick "make" and "break" of the circuit.



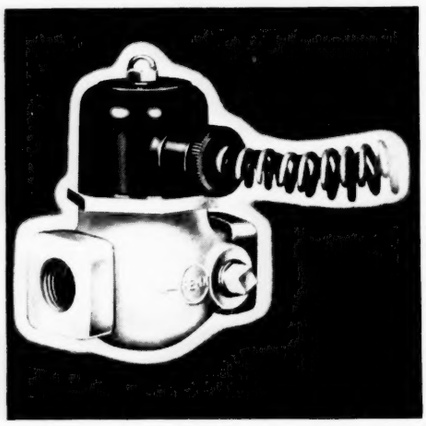
Transformer-Relay, a low voltage mercury contact relay which also acts as a transformer inducing low voltage (24 volts) on pilot circuit. Various types available for different applications.



Remote Stem Temperature Controls for numerous industrial requirements, such as refrigeration, air conditioning, also for control of liquids and gases.



Explosion-Proof Industrial Liquid Level Controls for use in gasoline service stations, flour mills or where dust or vapors form an explosive mixture with air.



For controlling gas flow.

Penn Solenoid Gas Valve

NAME—Penn solenoid gas valve.
PURPOSE—For controlling the flow of gas to gas-fired units.
FEATURES—Valves are provided with a brass valve seat and with a special oil treated meter sheepskin disc. It is stated that this construction assures a permanent tight seal unaffected by metal particles or the hammering of repeated operations over a long period of time. Valves close in the direction of the gas flow to further insure a tight seal. Valves are regularly supplied as standard automatic valves but may be had at no extra cost with semi-automatic button when so specified.
SIZES AND CAPACITIES—From ¼ to 1 in. I.P.T. with capacities from 25 cu. ft. per hr. to 435 cu. ft. per hr. based on gas of 0.6 specific gravity at ½ in. water pressure drop.
MADE BY—*Penn Electric Switch Co., Goshen, Ind.*

M-H Room Humid-U-Stat

NAME—M-H Room Humid-U-Stat H0900.
PURPOSE—For controlling the humidity of air.
FEATURES—This is a pneumatic hair element humidity controller designed for wall mounting. It is equipped with a temperature compensator which is said to maintain calibration so that it will control at the selected relativity even though the temperature changes. Dévice may be used either as a direct or reverse acting control by a simple adjustment. Also the throttling range may be adjusted on the job to prevent the wide variation in humidity which sometimes results from controls "hunting." Available in the scale range of 20 to 80% R.H. and with a throttling range from 2 to 30% R.H. Instrument is finished in silver bronze.
MADE BY—*Minneapolis-Honeywell Regulator Company, 2950 Fourth Avenue South, Minneapolis, Minn.*

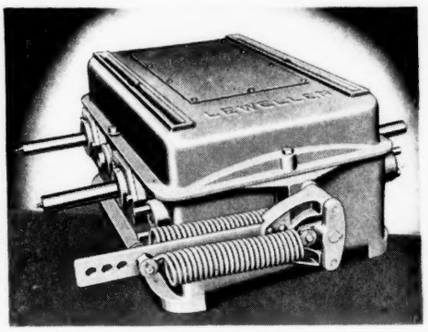
Barber-Colman Microtherm

NAME—Remote bulb Microtherm.
PURPOSE—A proportioning thermostat for controlling the temperature in hot water tanks, air conditioners, driers, and similar equipment.
FEATURES—This instrument is said to bring the many advantages of Barber-Colman's Micro control to situations where the requirements call for a motor operated valve or damper to be positioned accurately and quickly in accordance with load variations. The remote bulb and bellows assembly are hydraulically formed while the volume of liquid and conducting surfaces are balanced to give the minimum ambient temperature effect. The bulb is furnished with a mounting flange suitable either for immersion or duct mounting. Thermostats for two-position control and for floating control are also available.
MADE BY—*Barber-Colman Company, Rockford, Ill.*

Remote bulb thermostat.

M-H Duct Thermometer

NAME—M-H remote bulb thermometer W59A.
PURPOSE—For measuring air temperatures in ducts.
FEATURES—This thermometer is said to be designed specially for air conditioning applications and incorporates a remote bulb with a mounting clip to permit mounting the operating element where it will measure the temperature at the desired point within the duct. The thermometer is equipped with a universal mounting bracket which allows the face of the thermometer to point to the right, left or straight ahead and also to point at any angle between vertical and horizontal. Model W59B thermometer is similar to W59A except that it does not have a flexible element, but has instead a protecting well and is intended for insertion in water pipes or tanks. Both models have a range from —30 to +180F.
MADE BY—*Minneapolis-Honeywell Regulator Company, 2950 Fourth Avenue South, Minneapolis, Minn.*



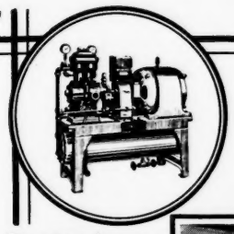
Controls stoker speeds from boiler pressure.

Lewellen Stoker Control

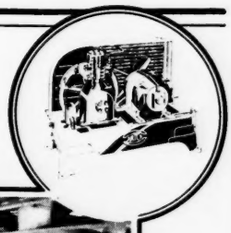
NAME—Lewellen stoker transmission and control.
PURPOSE—For regulating stoker speeds to maintain boiler pressure settings automatically.
FEATURES—This transmission and control system consists of a master regulator and a variable speed stoker transmission. The master regulator is connected to the boiler and is set to maintain a given steam pressure. Whenever the steam pressure changes, the master regulator changes the speed of the stoker transmission so as to bring the steam pressure back to the proper point. A change in boiler pressure as small as ¼ lb. is said to be sufficient to cause the control to operate. In addition to changing the stoker speed, the control also operates the boiler and air supply dampers so that the air supply and draft are set to provide the proper conditions for the new fuel feed. Whenever the control lever moves suddenly, the transmission speed is changed gradually by the action of springs to the position corresponding to the position of the control.
SIZES AVAILABLE—1 to 20 hp. Normal maximum limit 10 hp.
MADE BY—*Lewellen Mfg. Co., 1095 East 10th St., Columbus, Indiana.*

Hoppe Solenoid Valve

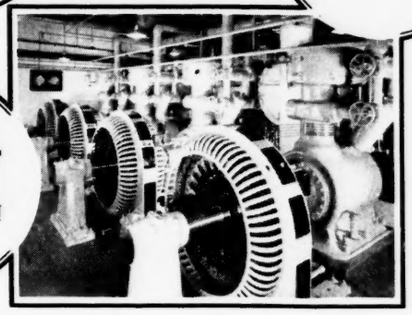
NAME—Type D solenoid valve.
PURPOSE—For severe service on steam, water, oil, air, or gas lines.
FEATURES—Body and cap of this valve are forged from No. 4 carbon-molybdenum steel. The cap is held with triplex steel bolt studs. Solenoid is of glass insulated wire designed to withstand temperatures of 1000F. The valves are designed to operate on 1250 lb. steam, 800 lb. oil at 900F, or 3000 lb. cold water, oil, or gas non-shock. Sizes are ½ to 2 in. in either horizontal or angle type, screwed or flanged ends. Also available with union cap in sizes from ¼ to 2 in.
MADE BY—*Hoppe Engineering Co., Indianapolis, Ind.*

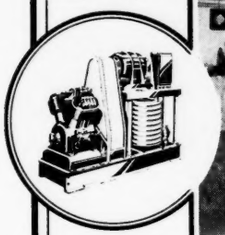


Low Pressure Units 1/4 to 15 Hp.



Direct-Drive Ammonia Units, 1/2 Hp.

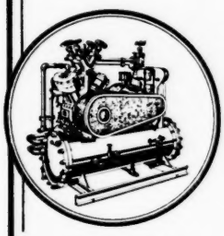




Freon-12 Units, 10 to 30 Hp.

4 Large 2-Cyl. Frick Compressors in Air Conditioning Service at the Philcade and Philtower Buildings, Tulsa, Oklahoma.

You're always right with FRICK Refrigeration

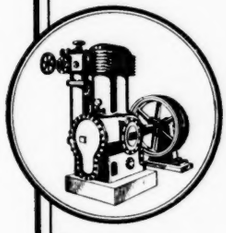


Type AV Ammonia Units 25 to 30 Hp.

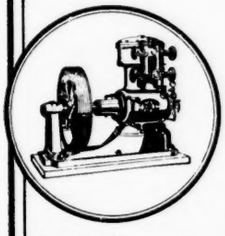
Because there's always a Frick machine of the type and size to suit your needs exactly. And 58 years' experience is built into every one of them—your assurance of dependable, profit-making operation.

Whether your problem is air cooling, dehumidification, or complete air conditioning through a central system or by individual units, you can get helpful recommendations from your nearest Frick Air Conditioning Sales Engineer.

Frick Branch Offices and Distributors in principal cities: write, wire or phone today.



Freon-12 Compressors in 6 Sizes



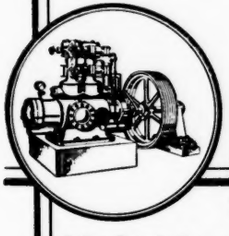
Ammonia Compressors in 10 Sizes

DEPENDABLE REFRIGERATION SINCE 1882

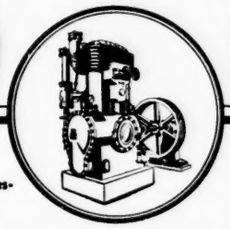
FRICK CO.

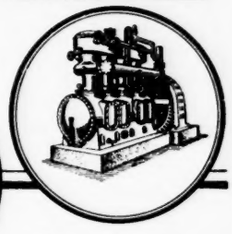
WAYNESBORO, PENNA. U.S.A.

Booster Compressors in 6 Sizes



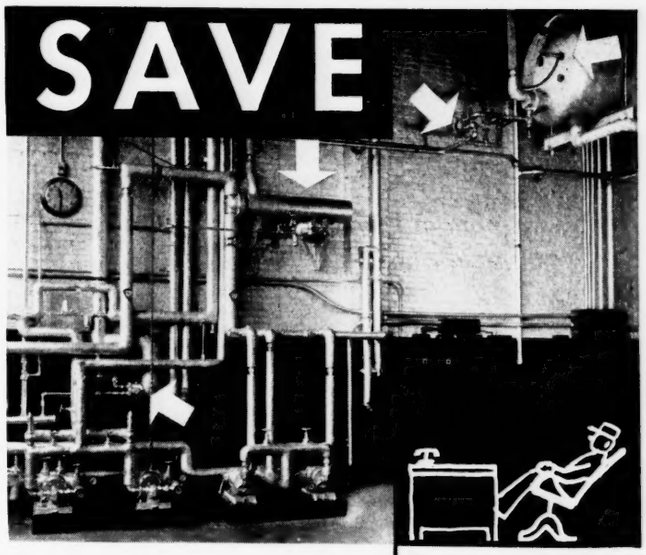
Carbon Dioxide Compressors in 6 Sizes





Large 4-Cyl. Compressors in 5 Sizes

SAVE

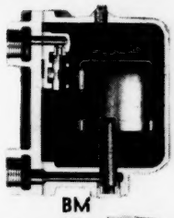


IN THE BOILER-ROOM, *too*

There are a dozen spots in the boiler room where SARCO SAVERS can improve your service and save fuel with an investment that will be forgotten in a few months.

Hot water can be held to exact temperatures giving better service and saving fuel by installing Sarco Temperature Controls and suitable Steam Traps. Oil preheaters properly equipped with traps and control can improve the efficiency of the entire plant. Sarco Strainers will keep the lines free of foreign material, and Sarco Steam Traps as drips on the main lines will keep them free of condensate and, therefore, live and efficient at all times.

The Sarco Family now includes equipment for gravity, vapor or vacuum, steam and hot water heating systems and complete service for process heating and cooling operations, including all types of steam traps and temperature control. Catalogs furnished on request.



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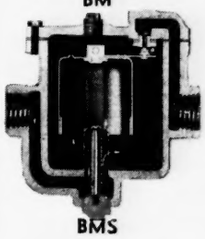

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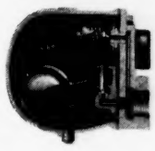

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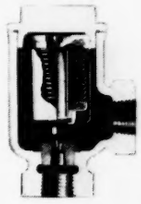

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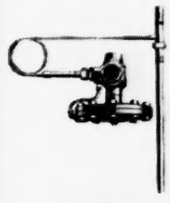


2430

SARCO SAVES STEAM

SARCO COMPANY, INC.
183 Madison Avenue, New York, N. Y.
SARCO CANADA LTD., FEDERAL BLDG., TORONTO, ONT.

100

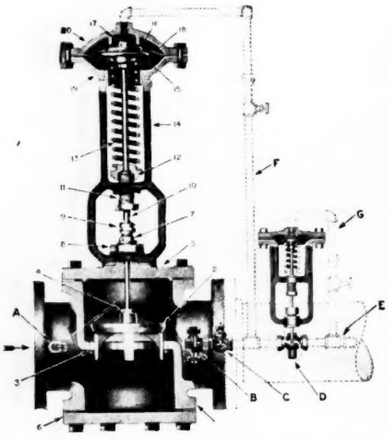
For protection against flame or ignition failure.

Mercoid Oil Burner Safety Control

NAME AND MODEL NO. — Mercoid Pyratherm type JM and JMI.
PURPOSE — For protection against flame and ignition failure.
FEATURES — Type JMI is for use with oil burners employing intermittent ignition while type JM is for constant ignition oil burners. These two devices are said to have two outstanding features. (1), the transformer repulsion-relay, which in principle is a low voltage transformer but also operates as a repulsion relay. It does not employ the conventional clapper type iron armature and is said to be not subject to residual magnetism. (2), a safety timing mechanism which provides a means for adjusting the period which a burner can operate without flame. Both controls are equipped with mercury contact switches. A two-wire hook-up is employed.
MADE BY—*The Mercoid Corporation, 4201 Belmont Ave., Chicago, Ill.*

McAlear Pressure Regulator

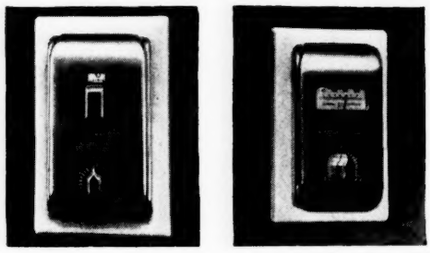
NAME — McAlear pressure reducing regulator No. 231.



For controlling steam pressures

PURPOSE—For reducing and controlling steam pressures.
FEATURES—Manufacturer states that this valve is an auxiliary operated valve of single seated construction. When employed for the control of steam, it is frequently used as a primary control valve, and a secondary valve of the weighted lever type is used in conjunction with it. Similar applications also permit the pressure by stages. Main valve of the radiator comes in either direct seated (spring opened) or reverse seated (spring closed) as desired. The main valve when direct seated is held open by spring tension and closed by inlet pressure by the diaphragm. The pilot valve is installed in the bleed-off connection of the main valve diaphragm with a line from the reduced pressure side connected to the pilot valve diaphragm. A slight fluctuation in the reduced pressure causes the pilot valve to open or close, thus varying the pressure on the main diaphragm and in turn maintaining the pressure for which the valve is set.
MADE BY—*McAlear Mfg. Co., 1901 S. Western Ave., Chicago, Ill.*

General Controls Thermostat



(Left) timer thermostat and (right) thermometer thermostat.

NAME—Timer thermostat and thermometer thermostat, series T80.
PURPOSE—For regulating room temperatures.
FEATURES — The thermally responsive mechanism is the large thermostat cover itself. Manufacturer states that intimate contacts between cover and bi-metal operates the thermostat and the bi-metal differential is but ¼F. Thermostat is equipped with a plastic base to thermally isolate the thermostat from the wall. The setting knobs are on the surface of the thermostat cover. There are three thermostats in this line, a regular thermostat, a thermometer thermostat and a timer thermostat. The thermometer thermostat has a visible bi-metal thermometer while the timer thermostat is equipped with a 13-hour clock.
MADE BY — *General Controls Co., Glendale, Calif.*

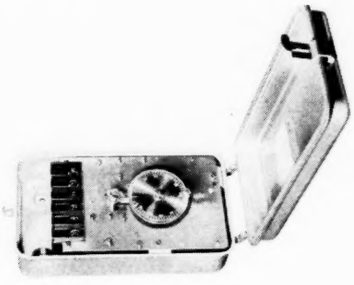
No magnets, gears or rotating parts.

Spencer Stoker Timer

NAME—KLIXON stoker timer.
PURPOSE—For controlling operation of stokers.
FEATURES—Timer is newly designed and is housed in an attractive metal container so that all operating parts are completely enclosed and protected from dust and interference. Stoker timer is non-mechanical in operation and does not contain magnet, gears or rotating parts. It is controlled by thermostatic disk working in conjunction with a laboratory calibrated heating element. Operating intervals for the timer can be set from ½ to 1 hr. Operating times vary from 2 to 7 minutes.
MADE BY—*Spencer Thermostat Company, 34 Forest St., Attleboro, Mass.*

Paragon Timers and Relays

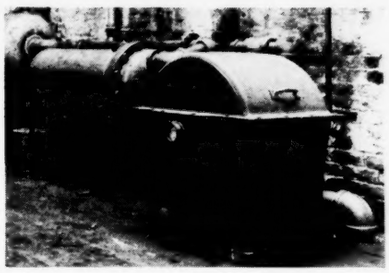
NAME—Paragon series of automatic re-set timers and time delay relays.
PURPOSE—For time control of air conditioning equipment.
FEATURES—These instruments can be used for the following purposes: (1) To close and then reopen a circuit; (2) to open and then reclose a circuit; (3) to make a momentary contact; (4) to repeat a preset schedule of momentary contacts or timed "on" and "off" operations, and (5) to reset instantaneously after a power failure. Timers are furnished with eight terminals.
MADE BY—*Paragon Electric Company, 37 West Van Buren St., Chicago, Ill.*



For time control.

ADSCO WATER HEATERS

STORAGE AND INSTANTANEOUS TYPES, SPECIAL HEATERS, HEAT ECONOMIZERS



An ADSCO Heat Economizer installation with an ADSCO Rotary Meter

An ADSCO Storage Water Heater

HAVE YOU A WATER HEATING OR COOLING PROBLEM?

ADSCO CAN HELP YOU WITH SOUND ENGINEERING EXPERIENCE, PLUS COMPLETE HEATER FACILITIES

For many years, ADSCO has specialized in the expert fabrication of heat exchange equipment to heat or cool water, oil, and other liquids. Each unit is simple in design, welded by experienced workmen to meet current code standards and to suit the individual operating conditions of the installation.

When in the market for storage or instantaneous water heaters, heat economizers, fuel oil heaters, or special heat exchanger units, put your problem up to ADSCO engineers for recommendations and quotation.

Write for Bulletins 35-75V and 35-76V.

AMERICAN DISTRICT STEAM COMPANY

NORTH TONAWANDA, N.Y.

IN BUSINESS OVER SIXTY YEARS

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STERLING Thermotrol

(INDIVIDUAL RADIATOR CONTROLS)

STERLING, INC.

3732M NORTH HOLTON ST. MILWAUKEE, WIS.

NON-CLOGGING

SPRAY NOZZLES

ALL SIZES *for* Air Conditioning

ALL TYPES

ALL CAPACITIES

A complete line of nozzles for air conditioning and industrial use. Write today for new catalog, data and application sheets and price list.

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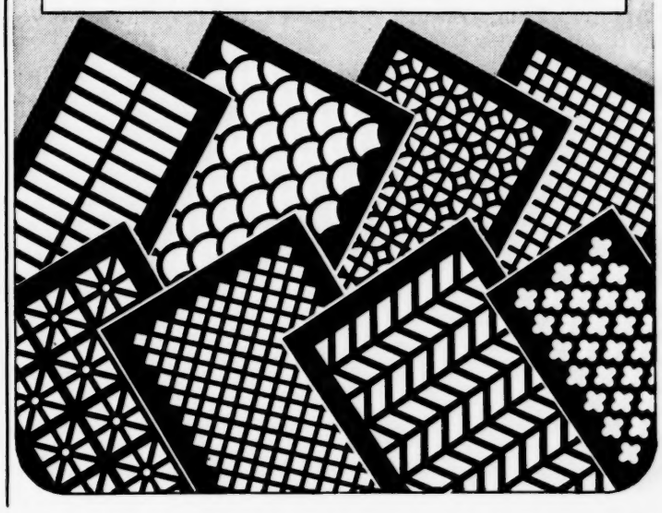
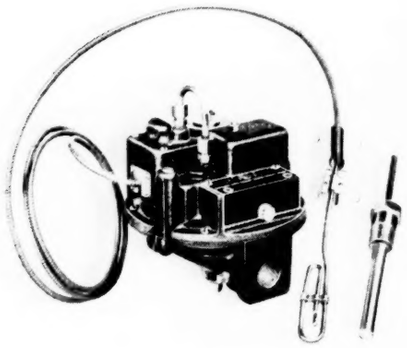




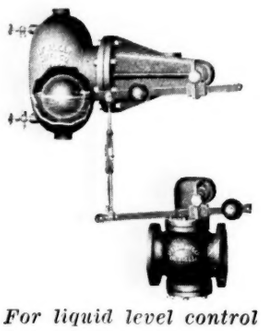
White Rodgers gas valve.

White Rodgers Gas Valve

NAME—White Rodgers gas valve.
PURPOSE—For controlling the flow of gas.
FEATURES—This device combines a diaphragm gas valve and a hydraulic action mechanical limit control in one unit. Manufacturer states that complete safety is assured at all times because normal operation of the limit control is not affected by electric power failure or by normal opening of the valve. Diaphragm valve is of the puff bleed type providing almost instantaneous shut-off of bleed upon burner ignition. It has an automatic re-cycling feature which, if the valve is opened manually, will return it to normal operation upon resumption of power service. Types for both warm air and hot water are available.
MADE BY—*White Rodgers Electric Company, 1209 Cass Avenue, St. Louis.*

McAlear Liquid Level Controller

NAME—Liquid Level Controller No. 823.
PURPOSE—For control of fluid levels in storage or process tanks, feed water heaters, condensers and similar liquid containers.
FEATURES—Device is a ball bearing liquid level controller with balanced lever valve for controlling fluid level. According to the manufacturer, it may also be used as a continuous drainer to handle large volumes of condensate from vessels. A mercury switch may be added to the control when desired to ring an alarm bell when the level reaches a dangerous point or to operate various colored lights to indicate high, normal or low level. Controller and valve are made for a maximum working pressure of 600 lb. at 750F. The valve comes in sizes up to 8 in. inclusive.
MADE BY—*McAlear Mfg. Co., 1901 S. Western Ave., Chicago, Ill.*



For liquid level control

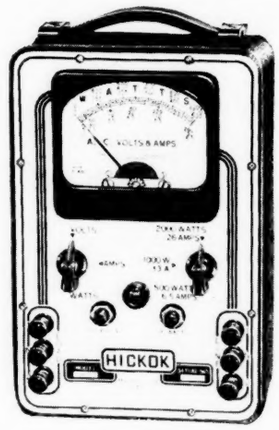
General Controls Valve

Hydraulic-action valve.

NAME AND MODEL NO. — Hydramotor G-2-1.
PURPOSE — For controlling the flow of liquids and gases.
FEATURES — Valve is operated by hydraulic action and is designed for use with fluids or gases such as water, air, gas, oil, gasoline, brine or steam. It is said that the valve will operate in any position and that the approximate opening time is 45 seconds and the approximate closing time is 10 seconds. No gears are employed and only one internal switch is used. Current consumption is said to be 60VA during opening cycle, 5VA when open. Valve is of single seated composition disc type.
SIZES AND CAPACITIES—From ½ to 4 in. I.P.S.
MADE BY—*General Controls Co., 700 W. Ivy St., Glendale, Calif.*

Degree-Day Gauge

NAME—Weatherwise Dodson degree day gauge.
PURPOSE—To indicate degree days.
FEATURES—Manufacturer states that this device eliminates the use of readings at distant weather bureau points and makes it possible to obtain the daily degree days merely by reading the gauge once a day. Gauge is sold for use in both 65 and 70F base degree day operation.
MADE BY—*Degree Day Systems, 49 West 42nd Street, New York, N. Y.*



For air conditioning appliance testing

Hickok Electrical Appliance Tester

NAME — Hickok Volt-Amp-Wattmeter, model 900.
PURPOSE — For measuring actual equipment loads in volts, amperes, and watts.
FEATURES—Manufacturer states that this device has been designed especially for air conditioning appliance testing. The scales have been extended to enable testing appliances as small as bell transformers and clocks to those as large as electric ranges operating on a 220-volt 3-wire Edison system. It is further stated that this device tests appliances while in actual operation and indicates wattage consumption, amperes, and line voltage.
CAPACITIES—A.C. watts, 0 to 2000; A.C. amps, 0 to 26; A.C. milliamps, 0 to 260, and A.C. volts, 0 to 260.
MADE BY—*The Hickok Electrical Instrument Co., Cleveland, Ohio.*

Minneapolis-Honeywell Thermostat

NAME — Two-stage Thermostat, M-H T802.
PURPOSE—A low voltage thermostat designed to control the "hi-low" or "hi-low-off" flame sequence provided by some types of gas or oil burners.
FEATURES—Two circuits, closing in sequence on temperature fall are provided—one controls the high, the other the low fire valve—and both are actuated by the same bi-metal element and magnet. This design is said to prevent the device from getting out of step and to assure proper operating sequence. The use of snap action open contacts is said to eliminate the need for critical leveling on the wall. This thermostat has a standard operating range of 54 to 86F with a non-adjustable differential ¾F on low stage and 1¼F on high stage. The high stage "makes" 1½F below the low stage.
MADE BY — *Minneapolis-Honeywell Regulator Co., Minneapolis, Minn.*

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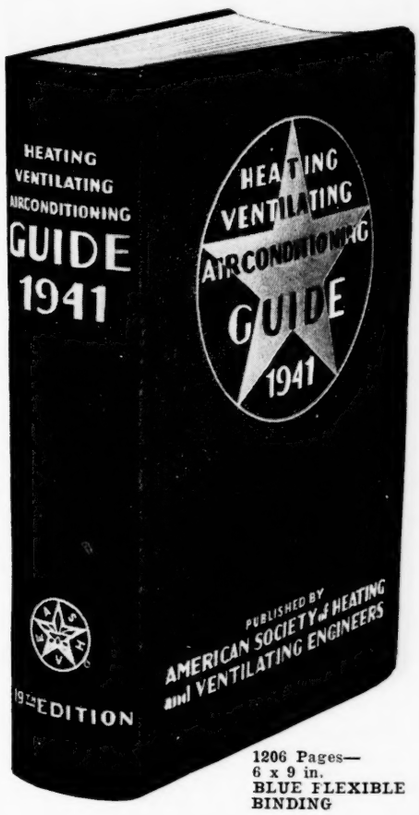

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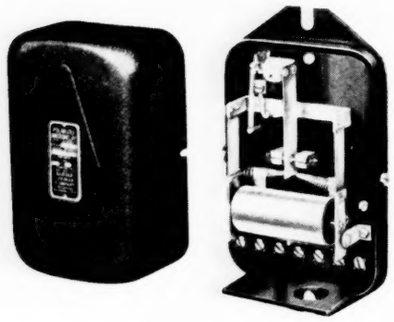
CONTROLS AND INSTRUMENTS



A balanced type relay for AC or DC circuits.

Barber-Colman Relay

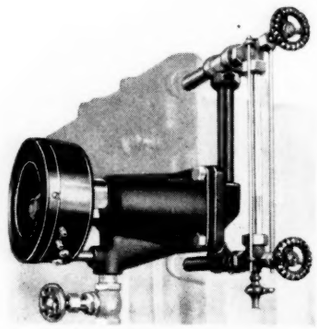
NAME—Polarized Microrelay.
PURPOSE—For many uses including: (1) for positioning motor-operated devices from either manually or automatically positioned potentiometers in self-balancing bridge circuits, (2) a voltage or current sensitive relay and (3) a conventional relay to protect delicate contacts in other circuits.
FEATURES—Four coils contained in the solenoid cylinder govern the movement of the tongue between the contacts. An armature is suspended horizontally in the axial center of this cylinder and when it is affected by a magnetic pull at either end of the cylinder because of an unbalanced condition in the bridge circuit, this motion is transmitted to the tongue causing it to move to one or the other of the contacts. This balanced solenoid action is said to permit rugged construction without affecting the sensitivity of the instrument.
MADE BY—*Barber-Colman Company, Rockford, Ill.*

Weston Stack Thermometer

NAME & MODEL NO.—Weston stack thermometer model 5-H-4.
PURPOSE—For measuring flue gas temperatures.
FEATURES—Thermometer was designed to enable heating contractors and service men to meet the requirements of the Oil Burner Industry Standards Committee. Thermometer is of the all metal type and is designed for use with a sleeve holder which sleeve holds the thermometer stem in a horizontal position in the center of the flue gas stream. A shatter-proof scale glass is employed. Temperature range is from 200 to 1000F with an accuracy guaranteed within 1%. In order to install this thermometer, it is necessary to drill a 5/16 inch hole in the pipe, insert the tapered sleeve holder until it fits tight, then slip the thermometer stem in the sleeve.
MADE BY—*Weston Electrical Instrument Corporation, 614 Frelinghuysen Ave., Newark, N. J.*

Mercoid Boiler Control

NAME AND MODEL NO.—Combination pressure and low water control, type DA-131Q.
PURPOSE—For protection of low pressure, automatically-fired steam boilers against the hazards of firing into a dry boiler or building up excess pressure.
FEATURES—Control complies with the ASME Code and is furnished with quick hook-up attachments for simplified installation. Unit is said to be light in weight and of packless construction. Double outside adjustments are provided for setting the pressure range and in setting the control it is merely necessary to turn the adjustments until pointers on a calibrated dial indicate the operating pressures desired. Unit is equipped with Mercoid switch. Range adjustable from 0 to 10 lb. Electric capacity 10 amp. at 115 volts, 5 amp. at 230 volts.
MADE BY—*The Mercoid Corporation, 4201 Belmont Ave., Chicago, Ill.*



For protecting boilers against lack of water or high pressure.

White Thermostat

NAME—Master thermostat, type A 23.
PURPOSE—For control of room temperatures.
FEATURES — Polarized snap-action which is said to be entirely new principle in thermostat design is employed which together with a sensitive bimetal blade is claimed to guarantee a minimum temperature differential. Instruments are set for a .5F differential and the manufacturer states that this differential is so small that no artificial heat is necessary to improve the sensitivity of the instrument. A mechanical snap-action which is said to eliminate chattering and arcing at the contacts together with a transparent shield which covers the contacts and protects them from dust is said to result in an instrument which functions for years on the same differential. Thermostat is designed with a range from 55 to 95F although it can also be furnished with a range as low as 35 to 75F.
MADE BY—*The White Manufacturing Company, 2362 University Avenue, St. Paul, Minn.*

M-H Zone Control System

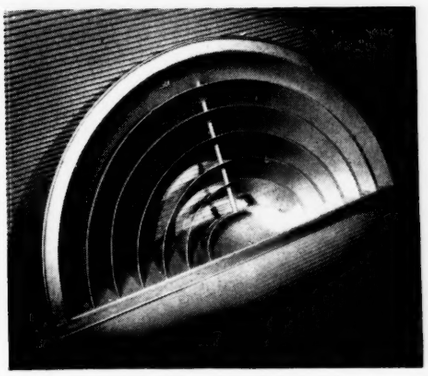
NAME — Averaging Thermostat zone control system.
PURPOSE — A modulating system for controlling two pipe steam heating plants where a constant source of steam is available.
FEATURES—Manufacturer states that this system is suitable for single or multiple zone application and that it employs two or more graduate-acting thermostats which are placed at representative locations in the zone and which position a modulating zone valve in accordance with their demand. Because the point of control is inside the heated space this system is said to be particularly well suited to jobs where changes in occupancy or internal heat load are a major factor, and where a single representative control location cannot be established. As the flow of steam is continuous, expansion noises in the piping and cold radiators are eliminated. Because the amount of steam supplied to the system is varied it is necessary that all radiators be properly orificed.
MADE BY — *Minneapolis-Honeywell Regulator Co., 2950 4th Avenue South, Minneapolis, Minn.*

Marsh Recorders

NAME—Marsh miniature recorders.
PURPOSE—For recording either temperature, pressure, cycle operation, or humidity.
FEATURES—These recorders are said to be moderately priced and portable. They measure 5 in. x 6 in. x 2¼ in. Included in all of the recorders is a fully adjustable clock movement to give a 24 hour record. All recorders are housed in cast aluminum, finished in satin black. Recording thermometers are available in a wide variety of ranges to record as low as — 20F to as high as + 110F. Pressure recorders are available in a wide variety to record pressures from as low as 30 in. vacuum to as high as 300 lb. Humidity recorders are suitable for use on temperatures between freezing and 125F and for a range from 0 to 100% R.H.
MADE BY—*Jas. P. Marsh Corporation, 2073 Southport Avenue, Chicago, Ill.*

Marsh pressure recorder

AIR HANDLING



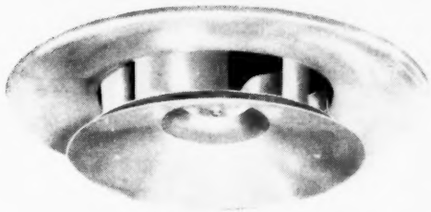
For introducing air without drafts.

Wall Type Anemostat

NAME AND MODEL NO.—Wall Anemostat, type W.
PURPOSE—For introducing air into rooms without drafts.
FEATURES — Device consists of a series of diverging semi-elliptical flaring members placed one within the other. The face of the device is mounted flush with the wall. It is stated that when the wall Anemostat is installed in connection with a duct system, the air which enters at a relatively high velocity is converted into a multiplicity of air currents traveling in layers or blankets in a variety of angles to each other. It is also claimed that at the same time, counter currents are created producing an aspiration effect which draws 35% of the room air into the device. This room air is mixed with the primary air and causes a rapid stabilization of the temperature in the conditioned space. Advantages claimed are draftless air diffusion and low velocity air turbulence throughout the enclosure, elimination of stagnant air pockets, even temperatures throughout the conditioned spaces, high outlet velocities permitting smaller duct work and a reduction in the number of outlets, and higher temperature differentials which permit a smaller air handling system.
SIZES AND CAPACITIES — 9 sizes with capacities ranging from approximately 32 to 3850 c.f.m.
MADE BY—*Anemostat Corporation of America, 10 East 39 Street, New York, N. Y.*

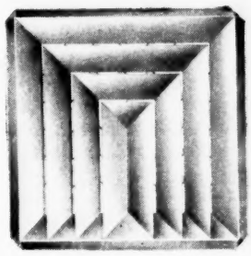
Demuth Air Distributor

NAME—Demuth air distributor.
PURPOSE—For introducing conditioned air into rooms without drafts.
FEATURES—Distributor consists of a ceiling flange and two deflecting cones. The ceiling flange is slipped into the duct connection and the first deflecting cone is mounted co-axially and spaced from the flange thereby forming an emitting nozzle. Within this nozzle opening are placed curved deflecting vanes. The second deflecting cone extends beyond the edge of the principal cone and is spaced away from the principal cone to form a tangential injector nozzle. The manufacturer states that the air distributor accomplishes three actions necessary to the balanced distribution of air. These three actions are stated to be (1) a circulatory motion which evenly distributes the conditioned air throughout the room, (2) a vortex, forming in the room directly below the device, draws the air of the room to the distributor, (3) an injector principle, providing a recirculation of the room air with the conditioned air. It is further stated that this distributor introduces air to the room at approximately a 10 to 15° angle from the ceiling in a circulatory path which is caused by the deflecting cone and the series of curved vanes. Distributor is installed by fastening the ceiling flange to the duct by means of steel screws and then using a single nut to hold the deflecting cones. Unit is available with or without lighting fixture.
SIZES AND CAPACITIES—Six sizes with neck diameter from 6 to 24 in. and capacities from 80 to 15,000 c.f.m.
MADE BY—*Charles Demuth & Sons, Jamaica, N. Y.*



For draftless air distribution.

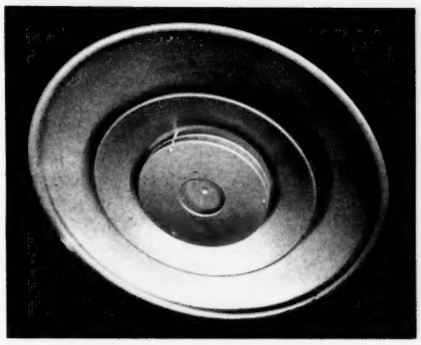
Air Devices Air Diffuser



Agitair type R three-way air diffuser.

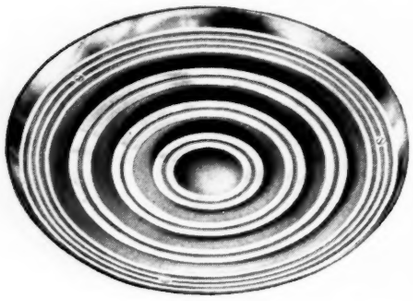
NAME—Agitair, type R diffuser.
PURPOSE—For introducing conditioned air into rooms without drafts.
FEATURES—Diffuser can be employed for either ceiling, sidewall or baseboard air delivery. It is said to be particularly suitable for those applications which require unequal air distribution without drafts, as for example in an off-center ceiling location. To take care of all such applications, the unit can be constructed to give either one, two-way, three-way, or four-way diffusion. One-way diffusers are made up of louvers running parallel to the side of the diffuser and at an angle of approximately 30° with the ceiling or wall to which the frame is attached. Between these louvers are small vanes inserted obliquely and designed to cause the air to leave the diffuser at an angle of 22½° or less with the wall or ceiling. The manufacturer states that a discharge angle of 22½° or less is desirable since it causes the air stream to follow the ceiling or wall. It is further stated that this construction of louvers and vanes is employed in place of simple vanes at 22½° in order to increase the free area through the outlet and thus decrease the size of the diffuser. The small vanes are also said to greatly increase the turbulence of the discharged air which results in a quick mixing of the conditioned air and room air and thus gives rapid temperature equalization. Two, three, four-way diffusers are constructed similarly but have vanes which discharge air in two, three or four directions.
MADE BY—*Air Devices—Incorporated, 17 East 42nd St., New York, N. Y.*

Plandaire Air Distributor



For draftless air distribution

NAME—Kno-draft ceiling type air distributing device.
PURPOSE — For introducing conditioned air into rooms.
FEATURES—Manufacturer states that these devices offer draftless diffusion, low resistance, and equalization of temperatures within the occupied zone. They are said to be easy to install, to effectively handle large volumes of air, and to pre-mix room air and supply air. Manufacturer further states that this device has a low decibel rating, is light in weight, and permits the use of higher duct velocities which result in smaller ducts and lower duct costs.
SIZES AND CAPACITIES—12 sizes with capacities ranging from 100 to 16,000 c.f.m.
MADE BY—*Plandaire, Inc., 207 Fulton Building, Pittsburgh, Pa.*



Tuttle & Bailey Aerofuse outlet.

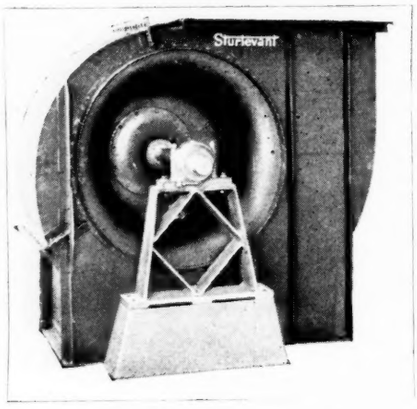
Tuttle & Bailey Aerofuse Outlet

NAME—Tuttle & Bailey Aerofuse Outlet.
PURPOSE — For introducing conditioned air into rooms.
FEATURES—The device consists of a series of cast aluminum rings shaped and spaced so as to form circular air passages with alternate low pressure areas. The manufacturer states that due to the special shape of the openings the supply air is delivered in a series of concentric jets. Each circular jet is said to turn outwardly immediately upon leaving the confinement of its passage to fill the nearest adjacent low pressure area. This action is said to result in a horizontal path of supply air which approximately parallels the ceiling. Manufacturer claims that due to this method of diffusion the supply air is brought in contact with the room air over the largest possible area immediately after leaving the outlet. It is further stated that the high rate of air mixture dissipates the energy of the supply air stream well before it reaches the occupied zone and the rapid mixture of supply with room air causes prompt temperature equalization.
SIZES AND CAPACITIES—4½ to 36 in. diameter, with capacities ranging from 25 to 4500 c.f.m.
MADE BY—*Tuttle & Bailey, Inc., New Britain, Conn.*

Type C Anemostat

New Type C Anemostat.

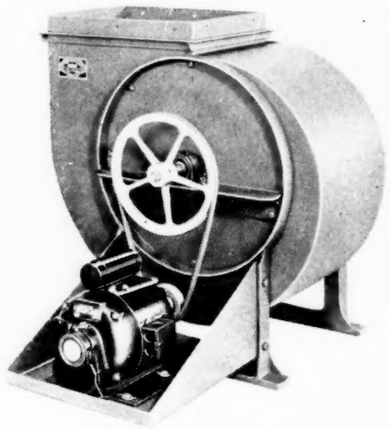
NAME—Type C Anemostat.
PURPOSE—For introducing air into rooms without drafts.
FEATURES—This modified type C Anemostat functions in the same manner as the preceding type C. However, the following improvements have been made: (1) the diameter of the outer cone has been reduced from a dimension approximately three times the neck diameter to a dimension approximately two times the neck diameter. Because of the smaller outer dimension, the ceiling opening will be correspondingly smaller. (2) The outer cone is finished with a moulded edge, to prevent smudging and streaking of the ceiling, while (3) the unit is said to be sturdier because the outer cone is strengthened by the moulded edge.
MADE BY—*Anemostat Corporation of America, 10 East 39th St., New York, N. Y.*



Reduced power consumption.

Sturtevant Fan

NAME AND MODEL NO.—Sturtevant Silentvane design 7 fan.
PURPOSE—For air moving in heating, ventilating and industrial applications.
FEATURES—Outstanding features are said to be: Slow rotative and peripheral speeds; quiet operation—resulting from streamline inlets; high efficiency; self-limiting horsepower characteristic with gradually increasing horsepower and volume until the point of maximum efficiency is reached, then decreasing horsepower for larger volumes; freedom from dust loading in rotors or fouling when handling dirty gas or air due to the use of straight fan blades pitched at an angle of 45° at delivery. Fan is available in all standard discharges, single and double width, single and double inlet with wheel diameters ranging from 14⅝ in. to 87 in., static pressures to 16 in. water gauge.
LITERATURE AVAILABLE—Bulletin 451.
MADE BY—*B. F. Sturtevant Company, Inc., Hyde Park, Boston, Mass.*



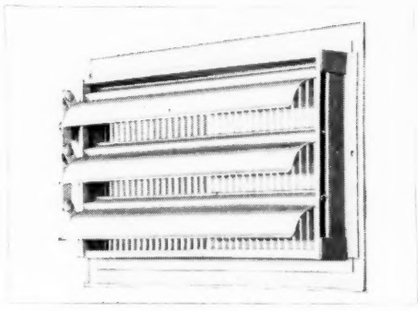
Complete motor blower unit.

Autovent Blower

NAME—Autovent belt drive blower.
PURPOSE — A complete blower unit for removing air.
FEATURES—The blower is set up as a complete unit with motor and V-belt drive and does not require special floor mounting or aligning of drives. It uses standard speed motors and is said to make an extremely flexible unit insofar as variation of air delivery is concerned.
MADE BY—*Autovent Fan & Blower Co., 1805 No. Kostner Ave., Chicago.*

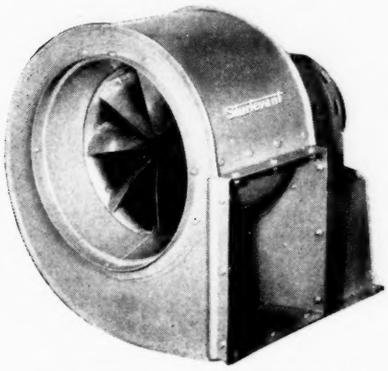
Auer Register

NAME—Airo-Flex register.
PURPOSE — For use with air conditioning systems.
FEATURES — This register features double directional control through adjustment of both grille face and back blades. It is built to permit sufficient adjustment of grille bars at time of installation for any combination of single air flow, straight, right or left. Upward and downward current is controlled by lever which regulates the new design Multi-Plane louvre for any desired directional flow, upward, straight or as much as 22½° downward. Register is furnished in the usual types for wall and baseboard.
MADE BY—*Auer Register Company, 3608 Payne Ave., Cleveland, Ohio.*



Double directional air control.

AIR HANDLING



For ventilating, air conditioning, and fume exhaust.

Sturtevant Blower

NAME—Rexvane Vent Sets.
PURPOSE—A general purpose blower or exhauster for general ventilating, air conditioning and fume exhaust.
FEATURES — These fans are of the centrifugal type with direct connected motor. A radial blade fan rotor is said to permit high rotative speeds, lower outlet velocities and more dependable balance when handling air which contains grease or solid particles. Cone shaped inlets are provided to guide inlet air to the rotor with a minimum shock and turbulence and consequent reduction in noise. Rotor consists of 8 blades, each of which is curved into the inlet in the direction of rotation. It is said that this design greatly increases the volume of air handled. Motors are of the NEMA specifications of 40° centigrade type.
SIZES AND CAPACITIES — 9 sizes with rotors ranging from 6 to 24 in. in diameter. Capacities from 250 to 6000 c.f.m. at ¼ in. static pressure.
LITERATURE AVAILABLE—Bulletin 406.
MADE BY—*B. F. Sturtevant Company, Hyde Park, Boston, Mass.*

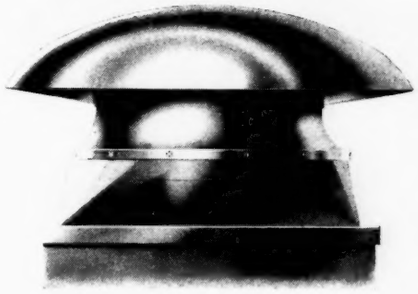
Controlair Balancing Damper

NAME—Mayn Air Damper.
PURPOSE—For balancing forced air and air conditioning systems.
FEATURES—The damper is said to provide for accessible and rapid one-man operation of balancing a system which has registers and grilles already installed. It is for use in the stack-head and replaces the basement pipe dampers. Manufacturer states that an outstanding feature of this damper is that while it is readily accessible it is tamper-proof due to a special patented type of screw head which can be operated only with the use of a special tool supplied with it. Other features are said to be a permanent automatic locking device, positive control, and a rattleproof and vibrationless operation.
MADE BY—*Controlair, Incorporated, Elyria, Ohio.*

Buffalo Forge Fan

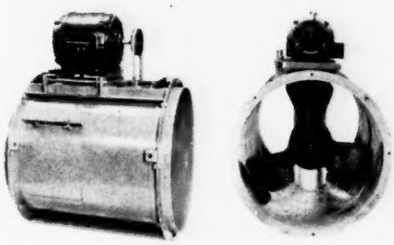
NAME—Buf-flow limit-load axial flow fans.
PURPOSE—For moving air.
FEATURES—This fan is said to be the result of thorough research and tests undertaken to improve efficiencies by correct proportioning of blades, hub, and inlet and outlet, to reduce objectionable noise by lower speeds and the proper directional vanes which reduce turbulence; to improve pressure characteristics by producing non-overloading power characteristics. It is said that this fan has an especially high capacity factor which means that a smaller size than heretofore required will adequately handle the work. Available in Arr. 2 for V-belt drive or in Arr. 4 for direct drive and for either vertical, down, or horizontal discharge. For a blowing fan, a bell inlet is furnished. Exhausting unit furnished complete with an inlet cone, flanged for connection to existing duct work. Can be mounted on floor, ceiling or side wall.
SIZES AND CAPACITIES—Seven sizes, ranging from 20 to 48 in. with capacities from 4800 to 69,360 c.f.m.
MADE BY — *Buffalo Forge Company, Buffalo, New York.*

DeBothezat Roof Ventilator



Ventilation independent of weather.

NAME—Power-flow roof ventilator.
PURPOSE—For supplying ventilation at all times independent of weather conditions.
FEATURES—Ventilator is said to move a large volume of air per horsepower while maintaining low tip speeds. This is said to result in quiet operation and increased efficiency. The fan is designed with non-overloading power characteristics to protect against burned out motors. A patented "log cone" entrance ring is provided to reduce entrance eddy losses. Ventilators are available in a large range of sizes and capacities.
LITERATURE AVAILABLE—Bulletin PRV.
MADE BY—*DeBothezat Ventilating Equipment Division, American Machine and Metals, Inc., East Moline, Ill.*



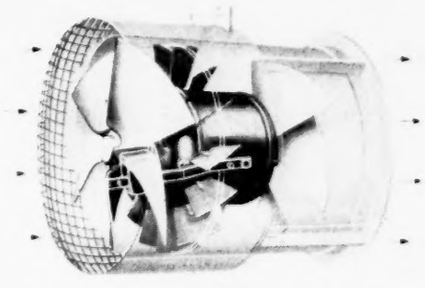
For handling contaminated air.

Wing Exhaust Fan

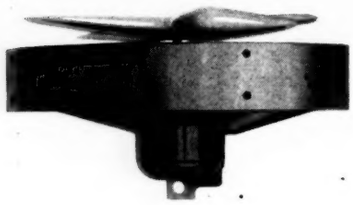
NAME—Straight-Line Exhaust fan.
PURPOSE—For moving air containing steam, dirt, fumes, paint, or similar materials.
FEATURES—Exhaust fan is equipped with Wing-Scruplex propeller fan which delivers large air volumes against duct or wind resistance. Motor is located outside of the air duct to keep it clean and cool and to reduce fire hazards when the air mixtures being exhausted are inflammable or explosive. Unit is available in horizontal or vertical design and is equipped with a belt drive to permit the selection of fan speed to fit any condition of air volume and resistance.
LITERATURE AVAILABLE—Bulletin EX 400.
MADE BY—*L. J. Wing Mfg. Co., 154 West 14th St., New York, N. Y.*

Wing Forced Draft Blower

NAME AND MODEL NO.—Wing forced draft blower, type COM.
PURPOSE—A forced type blower for supplying air at static pressures as high as 10 in. water.
FEATURES — Blower is of the axial flow type and is a two-stage unit. It consists of a constant speed, fully enclosed, dust proof motor with double extended shaft and an axial flow fan wheel mounted on each extension. Built-in adjustable damper mechanism placed between the two fan stages is said to effect a precise capacity regulation with decrease in horsepower over a wide range.
CAPACITIES — For capacities up to 50,000 c.f.m. at static pressures as high as 10 in.
MADE BY—*L. J. Wing Mfg. Co., 154 West 14th St., New York, N. Y.*



For static pressures up to 10 inches.



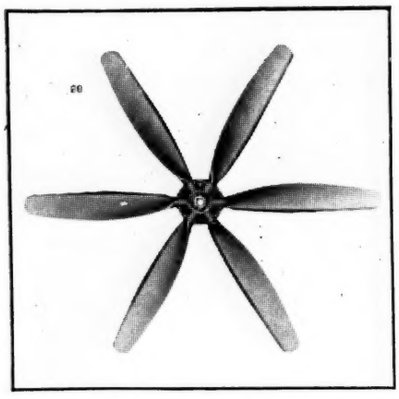
Power Roof Ventilating Fans.

Truflo Roof Ventilating Fan

NAME—Truflow roof ventilating fans.
PURPOSE—For applications where it is necessary to increase air removal in gravity-type ventilators or where wind velocity is not sufficient to ventilate building.
FEATURES—These power driven fans are equipped with cast aluminum alloy fan blades and are mounted in steel bands as illustrated. Motors can be had in open, totally enclosed non-fan cooled, totally enclosed fan cooled, and explosion proof types.
SIZES AND CAPACITIES—Six sizes from 18 to 48 in., with capacities from 2,000 to 40,000 c.f.m.
MADE BY—*Truflo Fan Company, 522 Main St., Harmony, Pa.*

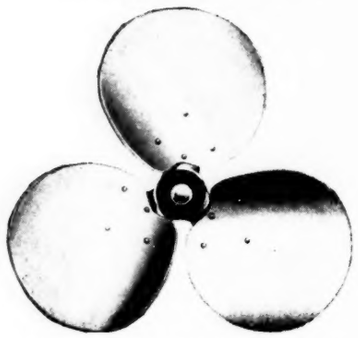
Hartzell Adjustable Pitch Fan

NAME—Adjustable-pitch cooling tower fan.
PURPOSE—For supplying air to cooling towers.
FEATURES—This fan is equipped with a propeller incorporating the features of the patented "tear-drop" blade which is said to permit the high speed air movement of the propeller type blade at tip speeds well below the requirements for quiet operation. The manufacturer states that since the blades are used in conjunction with a variable pitch hub which allows the use of from 3 to 12 blades and at the same time permits variation in pitch to give the proper amount of air, this fan is an ideal cooling tower fan. The blade is made of cast and machined aluminum alloy and the blade adjustment is said to be extremely easy. This fan is also equipped with a Charavay air-seal ring which is said to eliminate back flow of air at the propeller tips and thereby increases effective air delivery by 20% or more.
SIZES—36 to 130 in. diameter. Other sizes to order.
MADE BY—*Hartzell Propeller Fan Company, Piqua, Ohio.*



For cooling tower use.

Torrington Fan Blades



Airistocrat quiet propeller fan blades.

NAME—Airistocrat propeller fan blades.
PURPOSE—For circulating air.
FEATURES—A completely new series of three blade fans for air circulator work. Blades were previously made in 20, 24 and 30 in. diameter but are now made in 10, 12, 14, 16, 18, 20, 24 and 30 inch sizes. By slightly increasing the blade pitch on these fans the manufacturer claims to have obtained performance in free air which is equivalent to the performance of its 4-blade Airistocrat fans of equal diameters. While these fans are designed primarily for operation in free air, the manufacturer states that they can be used for light pressure work such as evaporative coolers. Blades are insulated from the mounting spiders which is said to result in smooth and quiet operation. They are offered in the same standard finishes as Airistocrat 4-blade fans.
MADE BY—*Torrington Manufacturing Company, Torrington, Conn.*

Grant Wilson Duct Connection

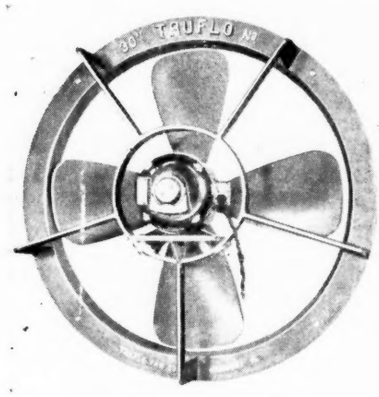
NAME—Flexible duct connection.
PURPOSE—For joining equipment such as blowers, heaters, and washers to ducts to stop vibration and noise from being transmitted through the duct system.
FEATURES—This duct connection material is available in bands 6 in. wide put up in a roll 50 ft. long. Both edges are selvaged to prevent fraying or ravelling and to make a tight permanent joint. The material is made up of woven flexible asbestos.
MADE BY—*Grant Wilson Inc., 4101 W. Taylor St., Chicago, Ill.*

Torrington Blower Wheel

NAME—Airotor blower wheel.
PURPOSE—A simplified, low price blower wheel.
FEATURES—Manufacturer states that this blower wheel has only four parts including the hub and that neither welds nor rivets are used in its assembly. This four piece construction is said to make it possible to supply the wheel at a much lower price than heretofore possible and to give the wheel greatly increased rigidity and efficiency. Features include, concentric rib serving as backing for blade strip formed at same time as hub socket to insure maximum degree of concentricity. Hub fitted and fastened securely to a cone shaped socket to insure concentricity, and rigidity. Deep formed concentric rib which insures trueness of wheel—this rib bears against the end of blades to minimize cantilever blade deflection. Deep formed radial ribs blending into hub socket, thereby stiffening back of wheel and resisting deflection by thrust against hub. Three thickness of metal making for a maximum strength.
MADE BY—*Torrington Manufacturing Company, Torrington, Conn.*

Truflow Wall Forms

NAME—Truflow fans.
PURPOSE—Propeller type fans for moving air.
FEATURES—These wall type fans are of aluminum alloy construction. Sizes 12 to 36 in. in diameter, employ 4 blade propellers while the 42 to 48 in. diameter sizes use 6 blades. The accompanying illustration shows a 30 in. diameter, 4-blade propeller fan, commonly used for exhaust purposes. The frame and propeller blades are both made of high tensile aluminum alloy, each cast in one piece. Wheel is mounted directly on the motor shaft. Motors available for single and variable speeds, and horizontal or vertical mountings.
CAPACITIES—Up to 40,000 c.f.m.
MADE BY—*The Truflow Fan Company, 522 Main St., Harmony, Pa.*



Made of aluminum alloy.

COLD WATER NECESSARY FOR COMMON PURPOSES

TABLE 1—ESTIMATED DAILY WATER REQUIREMENT OF PEOPLE

Type of Building	Gallons Necessary per Person per Day
Small Residence	35
Average Residence	50
Large Residence	100
Low Cost Apartment	75
Good Apartment	100
Hotels	100[1]
Office Buildings	25[2]

[1]This figure assumes 60% occupancy of rooms at any one time. Also, allow additional for any water-using equipment in kitchens, laundry and for cold rooms or refrigeration equipment consumption.

[2]About equivalent to allowing 25 gal. per day for each 125 sq. ft. of usable floor space.

TABLE 2—ESTIMATED DAILY WATER REQUIREMENT OF DOMESTIC ANIMALS

Kind of Animal	Gallons Necessary per Animal per Day
Horse, winter	7½
Horse, summer	15
Cow	25
Hog	2½
Sheep	1½
Chickens (per 100)	4

TABLE 3—ESTIMATED WATER CONSUMPTION FOR LAWN AND GARDEN SPRINKLING

For a ½" hose, allow 200 gal. for each hour hose is in use.

For a ¾" hose, allow 300 gal. for each hour hose is in use.

For a lawn sprinkler, allow 120 gal. for each hour of use.

TABLE 4—COLD WATER CONSUMED FOR HUMAN DRINKING PURPOSES

Service	Delivered Water Temperature	Waste and Consumption per Person per Hr. (Oz.)	Consumption Only, per Person per Hr. (Oz.)	Gal. per Person per Hr.	People Served per Gal.
School or Office (cup)	45-50	4.2	4.2	0.033	30
School or Office (bubbler)	45-50	10.5	4.2	0.083	12
Light Mfg.	45-50	18.3	7.32	0.143	7
Heavy Mfg.	50-55	25.6	10.24	0.10	5
Hot Heavy Mfg.	55-60	32.0	12.8	0.25	4
Eating Places	40-45	Restaurant, allow 0.1 gal. per meal; Cafeteria, 0.083 gal.			
Theaters	45-50	Allow 1 gal. per person in movies, allow 1 gal. per 100 seats in legit. house when fountain can store ½ g.p.m.			
Hospitals	45-50	Allow 0.083 gal. per bed and 0.083 gal. per attend.			
Hotels	45-50	Allow 0.08 gal. per room per hr.			
Public Fountains (parks)	45-50	20-35 gal. per hr. per fountain.			
Public Fountains in Dept. Stores, Lobbies, etc.	45-50	4-5 gal. per hr. per fountain.			

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H. & V.'s REFERENCE DATA—189

COLD WATER NECESSARY FOR COMMON PURPOSES

Tabulated on the other side of this sheet is information by the use of which the quantities necessary for many common purposes can be estimated. While no table can aim at completeness, this table does give cold water quantities for ordinary personal uses, for use by domestic animals, for cleaning and scrubbing, for lawn sprinkling, and for ordinary household operations.

In the case of water for use by people and by domestic animals, the commonest method is to base the consumption on the average daily use providing a supply capable of meeting the average requirement during the day and then making suitable allowances for hour to hour variations by means of tanks or reservoirs. It should be noted that in Table 1 the quantities are for personal uses only and that consequently additional allowances must be made where water is used for extraordinary service requirements such as laundry, refrigeration equipment, etc.

The unit *rate* of water use for lawn and garden sprinkling depends on the size of the sprinkler and on the pressure, but the amount used by any given device depends on how long it is permitted to run. The unit figures given in Table 3 are for the common hose sizes and are given in terms of gallons per hour as a convenient estimating unit.

Table 4 is based on the NEMA SPECIFICATIONS FOR DRINKING WATER QUANTITIES where the water is provided at a definitely controlled temperature. Where cold water is provided for these uses without having its temperature carefully controlled, it should be noted that considerably larger amounts of water may be used due to the common practice of letting the water run until it becomes cold. In this sense Table 4 may be regarded as the minimum amounts of cold water which are commonly provided for human drinking purposes where equipment for this specific purpose is installed rather than the maximum possible.

Example 1: What would be the estimated daily water requirement of an average low cost residence accommodating a family of 4 people, where a lawn sprinkler is operated 4 hours per day in summer, and where there are 2 horses and 200 chickens?

SOLUTION: From Table 1 allow 50 gallons per person per day for personal use or a total of 200 gallons per day. From Table 3 estimate that the lawn sprinkler would require 120 gallons per hour and for 4 hours per day this would indicate 480 gallons. From Table 4 allow 30 gallons for the 2 horses and 8 gallons for the 200 chickens. The total daily requirement is thus $200 + 480 + 30 + 8 = 718$ gallons.

In the above example it should be clearly noted that the *rate* at which the 718 gallons must be supplied can vary over a very wide range. All the water might be supplied in 1 hour or 1/24 of the total amount might be supplied each hour during the day, but in that case some kind of storage or reservoir would be necessary.

Note also that the above example does not take into account the very important question of diversity of use.

Example 2: How much cold water consumption should be allowed in a restaurant where 300 meals are served during a 2-hour period during the middle of the day?

SOLUTION: From Table 4 note that an allowance of 1/10 of a gallon per meal served would be made if the water were delivered as practically ice water at a temperature of 40 to 45F. On this basis the water consumed would be $1/10 \times 300 = 30$ gallons. This would represent the consumption during a two-hour period and a supply equipment capable of furnishing 15 gallons of water per hour would be sufficient. As in Example 1 it should again be noted that if storage of the chilled water for the restaurant were provided the *rate* at which the cold water would be provided would be considerably less than 15 gallons per hour.

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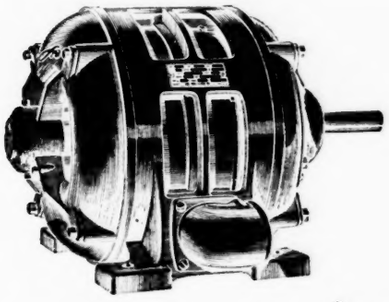
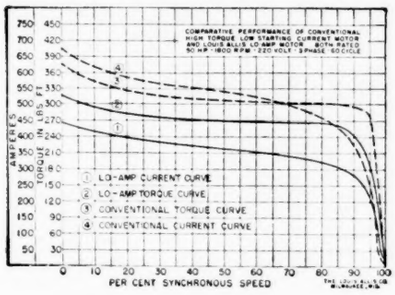
MOTORS AND ACCESSORIES

Allis Electric Motor

NAME—Lo-Amp electric motor.
PURPOSE — Specially designed for driving refrigerating and air conditioning equipment.
FEATURES—Manufacturer states that the inherent ruggedness, simplicity, high starting torque and low locked rotor current of this new motor make it perfectly adapted for refrigerating and air conditioning applications. Motor does not have any centrifugal switches, relays, brushes or slip rings and does not require special controls to operate. Curves 1 and 2 show the inrush current and starting torque of this motor as compared to curves 3 and 4, which show corresponding data on a standard double deck squirrel cage motor. Motors can be supplied with either high torque or normal starting torque.
MADE BY—*The Louis Allis Co., Milwaukee, Wis.*




COMPARATIVE PERFORMANCE OF CONVENTIONAL HIGH TORQUE, LOW STARTING CURRENT MOTOR AND LOUIS-ALLIS LO-AMP MOTOR BOTH RATED 50 HP-1800 RPM-220 VOLTS-3 PHASE-60 CYCLE
AMPERES
TORQUE
PER CENT SYNCHRONOUS SPEED
1 LO-AMP CURRENT CURVE
2 LO-AMP TORQUE CURVE
3 CONVENTIONAL TORQUE CURVE
4 CONVENTIONAL CURRENT CURVE

Louis Allis Lo-Amp motor.

Randall Pillow Blocks

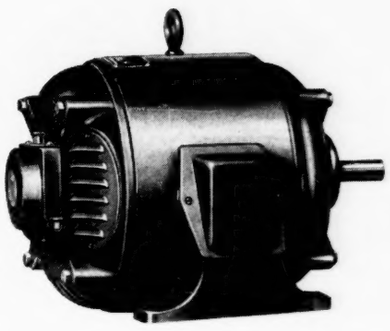
NAME—Randall one-piece steel housing pillow block.
PURPOSE—A low priced pillow block.
FEATURES—Bearing is of one-piece steel housing type designed to handle shafts of 1 1/16 to 1 5/16 in. diameters. Features claimed include quiet operation, selective mounting positions, constant self-alignment, self-lubrication and one-third less weight. The assembly consists of three parts, the one-piece steel housing, a machined cast iron ball with large oil reservoir, and a patented bronze bushing with graphite filled grooves to provide lubrication.
MADE BY—*Randall Graphite Products Corp., 609 W. Lake Street, Chicago, Ill.*

Spencer Motor Protectors

NAME—KLIXON protectors.
PURPOSE—For protecting a.c. motors from overheat and overload.
FEATURES—When built into a motor, manufacturer states that these protectors automatically cut the motor out of the line the instant damaging temperatures are reached in the motor. They are applicable for use with single and polyphase motors. Protectors available and application ranges are as follows: (a) ½ in. protector provides inherent overload and inherent overheat protection for fractional hp. single phase motors up to ¼ hp. Also used as an inherent temperature control unit on large integral horsepower poly-phase motors; (b) 1 in. protector provides built in overload and overheat protection for fractional horsepower, single phase motors through 1½ hp. (c) 1½ in. protector provides inherent overheat and overload protection for single and poly-phase motors up to and including 3 hp. On single and poly-phase above 3 hp. available for inherent protection against heating and excessive current (breaking pilot circuit of motor contactor, not the load directly). (d) Two pole protector, for certain types of fractional hp. repulsion-start induction and capacitor motors.
MADE BY—*Spencer Thermostat Company, 34 Forest St., Attleboro, Mass.*

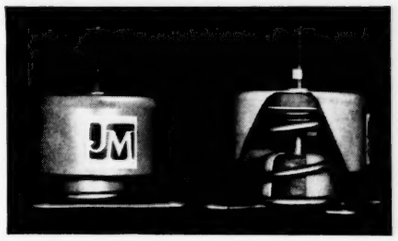
Century Single Phase Motor

NAME—Century repulsion start, induction single phase motor.
PURPOSE—To meet the demands of installations where high starting torque, low starting current and automatic starting are desirable.
FEATURES—The manufacturer states that these motors possess the desirable starting characteristics of the repulsion motor and the operating characteristics of the induction motor. During the starting period the motor operates as a repulsion motor with the brushes bearing on the undercut commutator. As the motor approaches full-load speed, the governor automatically short circuits the rotor winding, changing it into an induction motor, and the brushes are removed from contact with the commutator. These motors are self-starting under full load and the manufacturer states that their efficiency is higher than that of any other type of single phase motor. The static torque of the 3 hp., 60 cycle, 1750 r.p.m. and smaller motors is said to be not less than 450% of full load torque while the static torque of larger sizes varies with the horsepower, speed and frequency from 400 to 250% of full load torque. The manufacturer states that any approved switch may be used for starting and stopping the motor and that the fuses which will protect the motor while running and carrying its load are usually of ample capacity for starting due to the low starting current and quick acceleration.
SIZES & CAPACITIES—12 sizes with capacities ranging from ⅛ to 7½ hp.
MADE BY—*Century Electric Company, 1806 Pine St., St. Louis, Mo.*



Starting characteristics of repulsion motor and operating characteristics of induction motor.

Johns-Manville Vibration Isolator



For vibration control.

NAME—J-M controlled spring isolator.
PURPOSE—For isolating vibration from motors, generators, pumps, ventilating fans and similar equipment.
FEATURES—The working parts of this unit consists of a coil spring and rubber load pad which support the equipment and isolate vibration and an adjustable snubber inside the base which controls excessive motion. It is said that this isolator will take care of horizontal and torsional as well as vertical vibration and the manufacturer states that it is particularly efficient for low frequency vibrations. Loaded overall dimensions are 6 x 6 in. by approximately 3¾ in. high. Isolator is inclosed in a metal jacket designed to protect the rubber coils from oil and light.
SIZES—Two sizes: light duty for loads from 60 to 190 lb. per isolator and heavy duty for loads from 250 to 720 lb. per isolator.
MADE BY—*Johns-Manville, 22 East 40th Street, New York, N. Y.*

NEWS OF THE MONTH

Refrigerating Engineers Elect L. L. Lewis at 36th Meeting; Next Meeting Scheduled for Cincinnati

NEW YORK—Three hundred and fifty members and guests registered for the 36th annual meeting of the American Society of Refrigerating Engineers held in New York December 3-5. The attendance at the various sessions was large and there were many discussions on the papers.

New officers of the Society for 1941 are: L. Logan Lewis, president, Dr. William R. Hainsworth, vice-president, Charles R. Logan, second vice-president, and John F. Stone, treasurer. Directors for three-year terms are: Dr. Arthur W. Ewell, A. B. Stickney, J. H. Ashbaugh, F. H. Faust, Dr. D. K. Tressler, and C. S. Leopold.

The 1941 spring meeting is to be held in Cincinnati, the date to be announced later.

At a conference on the operation of air conditioning systems, held on Tuesday, C. W. Walton, of Rockefeller Center, spoke on "Large Comfort of Air Conditioning Systems." In his talk he stated that the engineers at Rockefeller Center found that an effective temperature of 71F was most suitable for the type of installation in their building. Also that a 12F differential was the maximum they could maintain and still keep most people comfortable. Rockefeller Center employs a large number of maintenance engineers who handle not only the air conditioning but also other types of mechanical equipment.

H. T. Waechter of the W. T. Grant Company spoke on "Chain Store Conditioning" and his paper reported on conditions which were almost opposed to those found in Rockefeller Center. He reported that the systems in the Grant Chain stores were designed to be as simple and automatic in operation as possible since even on units up to 100 tons operating engineers were not employed.

In most cases an employee of the store was given a special training and it was up to him to operate the system and to perform minor maintenance operations. These men have other duties and can give only part of their time to the air conditioning system. However, close supervision and inspection is made on the systems by the company engineers.

R. S. Gardner closed the conference with a discussion of the "Water Situation in New York."

Other papers of interest to air conditioning engineers which were presented included the following: "The Thermal Insulating Properties of Silica Aerogel," by John F. White; "Refrigeration in the Colleges," by B. H. Jennings; "Aluminum and Refrigerating Equipment," by Dr. R. B. Mears; "Isolation of Vibration for Refrigerating Machinery," by J. G. Aldinger and Emil T. B. Neubauer, and "Status of Mechanical Refrigeration Safety Laws in Various Parts of the United States," by Carl F. Brooks.

L. L. Lewis, new president of A.S.R.E.

The paper on silica aerogel was interesting to many of the engineers because silica aerogel is a comparatively new insulating material. It is reported to be an unusually efficient heat insulator and has a conductivity coefficient that is lower than that given by still air. It has a density of about 7 lb. per cu. ft. and a thermal conductivity of 0.15 B.t.u. per hr. per sq. ft. per in. thickness per degree F. It is said to be capable of being heated to 1400F without undergoing any physical change, although the conductivity increases.

Karassik Wins Essay Contest

NEW YORK—At its annual meeting December 2, Hydraulic Institute, national association of pump manufacturers, presented three awards to the winners of its first annual engineering essay contest. The contest was limited to the employees of the members of Hydraulic Institute.

First prize was awarded to I. J. Karassik, Worthington Pump and Machinery Corp., for his paper Thermodynamics of Boiler Feeding. Prizes were also awarded to Hans Gartmann and Hollis T. Waldo for their papers on The Operation of Centrifugal Boiler Feed Pumps and Submergence for Centrifugal Condensate Pumps.

Mollenberg Heads A.C. Council

BUFFALO—Richard H. Mollenberg, Mollenberg-Betz Machine Co., has been elected president of the Air Conditioning Council of Western New York. He succeeds Edwin F. Cooney, president of Cooney Refrigeration Co. Inc. Other officers for the coming year are:

Walter E. Voisinet of Walter E. Voisinet Air Conditioning Accessories, vice-president; Harry C. Shafer, sales manager of the Iroquois Gas Corporation, treasurer, and Walter P. Davis, supervisor of the Commercial Section of the Buffalo Niagara Electric Corporation, executive secretary.

13 Technical Papers Scheduled for 47th ASHVE Meeting

KANSAS CITY—Thirteen technical papers will be presented at the 47th annual meeting of the ASHVE to be held here January 27-29 at the Hotel Muehlbach. The technical program follows:

JANUARY 27—2 P.M.

A Comparison of the Weight, Particle Count and Discoloration Methods of Testing Air Filters, by Frank B. Rowley and Richard C. Jordan.

Comfort in High Altitude Flying, by D. W. Tomlinson.

Boiler Testing Codes, by J. F. McIntire.

Warm Air Furnace Testing Codes, by F. L. Meyer.

Codes in the Stoker Industry, by E. C. Webb.

JANUARY 28—10 A.M.

Report of Committee on Research—A. E. Stacey, Jr., chairman.

Friction in Fluid Flow, by F. E. Giesecke and J. S. Hopper.

Radiation as a Factor in the Sensation of Warmth, by F. C. Houghten, S. B. Gunst and J. Suciu, Jr.

Operating Costs of Residence Wall Heating System, by E. J. Rodee.

JANUARY 28—2 P.M.

Comfort Requirements for Low Humidity Air Conditioning, by F. C. Houghten, H. T. Olson and S. B. Gunst.

The Influence of Physiological Research on Comfort requirements, by R. W. Keeton, F. K. Hick, Nathaniel Glickman and M. M. Montgomery.

Comfort and Health and Temperature—A Mathematical Solution, by W. L. Fleisher and W. L. Fleisher, Jr.

Summer Cooling in Research Residence with a Gas-Fired Dehydration Cooling Unit, by A. P. Kratz, S. Konzo and E. L. Broderick.

JANUARY 29—10 A.M.

A Laboratory Method for Cyclic Heat Measurements on Walls and Roofs, by F. G. Hechler and E. R. Queer.

Reheating by Means of Refrigerant Compressor Discharge Gas, by S. F. Nicoll.

Heat Gain Through Western Windows With and Without Shading, by F. C. Houghten and David Shore.

McGeough on Motors and Controls

TORONTO—Fifty members attended the December meeting of the Ontario chapter, ASHVE, featured with an address on "Selection and Application of Motors and Control for Heating and Air-Conditioning Equipment," by Ray McGeough, Canadian General Electric Co., Ltd.

Building Congress Report Realistically Defines Present Situation; Covers Prefabrication, Defense, Professional and Labor Problems

NEW YORK—In order to recommend what shall be done locally to make the services and resources of the building industry most helpful in national defense, and in keeping alive and satisfying the demands of normal business, the coordinating committee of the New York Building Congress presented a consolidated report of its findings before the Chamber of Commerce of the United States on December 5.

Briefly the report covered the following points:

"*Government Control:* It is fundamental to the abnormal situation that the industry must bend to the needs of the emergency, but without surrender of independence and initiative, and when 'normalcy' has been restored it should be able to shift from Government to private building without loss of competence.

"*Adjustments and Corrections:* The construction industry is rugged and will perform when called upon. Nevertheless, there are errors and abuses to be corrected and vital adjustments to be made, if the industry is now to fulfill the emergency demands, efficiently and economically, and afterwards to accept peacetime opportunities.

"*Some Effects of Prefabrication:* Prefabrication which has crept gradually into the construction of large projects, is particularly adaptable to Government work and is surely destined to play a greater part in the industry. If more young men are not trained as apprentices, and other causes of labor shortage go unresisted, then prefabrication will grow to offset the scarcity of available mechanics. That temporary compensation may in the end prove to be a permanent benefit. If more work is done in the shop rather than in the field, it should tend to make employment more continuous, it should capture the economies of machine production which have so largely been lacking in field work, and generally speaking, it should increase the annual income of the workman, produce more quickly a better and cheaper structure for the consumer.

"*Architect and Engineer:* On some Government work the role of the architect is being changed, especially where large contracts are let on a cost-plus-fee basis. There we find a concentration of talent and equipment called for right on the site, with the permanent offices of the architect, engineer, contractor, and subcontractor left almost completely unused. If, for instance, it is a munitions plant, then a factory official may head the field group in design and construction, as well as other phases, on the theory that being the most familiar with the practical manufacture of the products, it is logical for him to supervise the construction of the plant and the installation of the equipment. The architect, if he accepts the work, is forced practically to abandon all other work. Moreover, having transplanted his best talent from his own office to the job it soon loses its identification with him and is in danger of being taken over by the Government, or, if his private practice wanes it may possibly be absorbed by others. If the system proves as effective as it would seem to be, then there is nothing left for the architect but to make the sacrifice for the emergency and to hope that because of his contribution the Government will consider his status sympathetically. On the contrary, it well may be that the architect will return to his home office at some future date with a strengthened and more experienced organization. However, the situation calls for observation and thought. The engineer has the same general condition to meet.

"*Use of Smaller Organizations:* The smaller contractors (both general and sub) are ordinarily overlooked when Government is letting large preparedness orders. But their initiative and knowhow constitute a great potential power which should be harnessed in any endeavor which pretends to utilize the full force of an industry.

"*Serving the Consumer:* In the endeavor to simplify the job unit the Government attempted to eliminate some subcontractors but that move has since been rescinded. Undoubtedly trial and error will bring about more changes and further developments. This conception of a complete job organization has for a long time been in the making and will undoubtedly influence many future practices. The system is applied to lump sum contracts as well but not to the same extent.

"*Labor's Opportunities and Deserts:* There are concentrated in New York City probably more superior craftsmen among building mechanics than anywhere in the country, if not in the world. They deserve the chance to work and to live under good conditions; to have intelligent employers and honest union officials; to be adequately compensated and surrounded by opportunities to rise. At the same time the employer deserves the maximum quality and output of which the employee is capable without strain upon health. Those simple objectives are most likely of attainment when the cost of building has been substantially reduced and the annual income of the worker substantially increased because then the volume of building will increase, unemployment diminish, and the security and standard of living for the worker improve. Many reductions in cost are obtained through specialization but beyond a certain point specialization may cause diminishing and finally a negative return. It is not intended even to intimate that we revert to the old method but it is recommended that present custom be modified sufficiently to allow men to get as broad training as is possible and to acquire greater flexibility. Many workers in most industries have more or less continuous employment, but when a construction job is completed the organization which built it disbands and frequently the next job will be different. Still more important, if the methods and techniques of the industry are changing, as is believed by your Committee, then a wide experience and ready adaptability will stand those workers in good stead who must change with its customs and practices.

"*Middlemen:* The middleman or jobber is still needed to perform many services in the building industry. He is frequently an aid to timely distribution in convenient quantities and can often, by an intimate knowledge of both the local consumer and the remote manufacturer, provide economies and accommodations which might be unattainable at a comparable cost for a large producer directly serving a small user. Too often, however, the middleman continues a practice grounded upon a need which no longer exists. In those cases he should be eliminated because he merely adds cost, confusion and misunderstanding to the transaction.

"*Contingent Benefits:* Your Committee has considered a number of local influences which fall upon our industry, as well as most others in the City. There would seem to be sound reason in the Federal policy of spreading industrial activities, especially for preparedness production. Too great concentration is dangerous in time of war for several reasons other than aerial attack. Although the attacks on London should not go unheeded in considering the defense of New York City, the two cannot be compared in accessibility. That the Army recognizes the unlikelihood of serious air bombardment of New York City is evidenced by the lack of plans for protective measures. This City and its environs are surely already important enough to attract enemy attack if any is to be made, so that an increase in activities will scarcely add to the inducement."

AGAEM to Convene in Los Angeles

NEW YORK—The annual convention of the Association of Gas Appliance and Equipment Manufacturers will be held at the Ambassador Hotel, Los Angeles, June 3-4-5, according to W. E. Derwent, president of the Association.

A packaged air conditioning unit for auto trailers is one of the new Carrier products which will be shown in operation at the Third All Industry Refrigeration and Air Conditioning Exposition at the Stevens Hotel, Chicago, Jan. 13-16. Shown here inspecting the world's first air conditioned trailer are, left to right, H. G. Strong, Carrier branch manager, Chicago; Mark E. Mooney, Carrier branch dealer manager, Chicago, and M. W. Knight, chairman of the exhibition committee. The girls will usher at the exhibition.

P & W Expand A. C. Facilities

HARTFORD, CONN.—Forced to provide more facilities for the manufacture of precision gauges, used by other firms in the war industries and by various government departments, the Pratt & Whitney Division of Niles-Bement-Pond Company is constructing a $750,000 addition to the Charter Oak plant. Part of the 40,000 square feet of additional floor space will be used to expand the present "constant temperature room."

New President for The Austin Co.

CLEVELAND—George A. Bryant, executive vice-president and general manager of The Austin Company since 1930, has been elected president and general manager of this national engineering and construction organization, succeeding the late W. J. Austin.

G. A. Bryant

Mr. Bryant, a native of Chicago, received his engineering education at the University of Illinois and first became associated with the Austin Company as a field engineer in 1913. In 1916 he was named district superintendent in New England, and shortly thereafter became manager of the company's Philadelphia office. Later, in 1918, he was made general sales manager for the entire country.

Room Cooler Association Formed

WASHINGTON—A Room Cooler Division has been formed by the Air Conditioning and Refrigerating Machinery Association, Inc., reports S. E. Lauer, ACRMA president. Membership in the Division will be limited to those Association members engaged in the manufacture or sale of self-contained room coolers and room air conditioners in capacities up to 15,000 B.t.u. per hour.

The principal activities of the ACRMA Room Cooler Division will be the compilation of industry statistics of sales and inventories, equipment standardization, and standard rating and testing and certification of capacities of various models of room coolers.

"The past few years have seen substantial growth in the use of room coolers for a variety of comfort-cooling applications," ACRMA claims, "and it is expected that this type of equipment will eventually provide an important volume of sales for the air conditioning industry. A constantly-improved product and increased sales, particularly in the residential and small office markets, should result from the establishment of the ACRMA Room Cooler Division."

The ACRMA announcement has another point of special interest to the air conditioning industry in stating the size or capacity of room coolers in B.t.u. rather than in terms of the generally-used, but now almost meaningless, "horsepower." On this, ACRMA comments: "As motor nameplate ratings, notably in the smaller sizes, are far from reliable guides, it is logical that the air conditioning industry should seek a less elastic yardstick by which its customers may measure value."

Annual Index to HEATING & VENTILATING

The Index to HEATING & VENTILATING for 1940 is almost completed and will be mailed on request to any subscriber. Please address inquiries to Circulation Manager, HEATING & VENTILATING, 148 Lafayette St., N. Y.

Louisiana Engineers Plan Meeting

NEW ORLEANS—The annual meeting of the Louisiana Engineering Society, to be held at the St. Charles Hotel here Jan. 10-11, will include a paper on Radiant Heating and Cooling by Dr. F. E. Giesecke of Texas Agricultural and Mechanical College and president of ASHVE, and one on Solving the Dust and Dirt Problem Electrically by S. R. Orem, Jr., Precipitron application engineer of Westinghouse Electric and Manufacturing Co.

A.C. for Jones & Laughlin Furnace

SYRACUSE—The first installation of air conditioning in a northern blast furnace was announced December 5 by E. T. Murphy, vice-president in charge of marketing of Carrier Corporation. It will be installed in the number one blast furnace of the Jones & Laughlin Steel Corporation, Pittsburgh, one of the world's largest furnaces.

The air conditioning equipment—capable of removing seven to forty tons of water per day from the air blown into the furnace—will control more closely the quality of the iron produced, Mr. Murphy explained.

With an air blast of constant humidity, it is possible to control the silicon content and iron temperature within narrow limits which are two major factors having a direct bearing on steel quality. With such iron, the production of steel by both the Bessemer and open hearth processes can be increased. Further advantages are seen in possible reduction in the amount of coke and limestone necessary to produce a ton of iron and an actual increase in iron production may be expected.

The air conditioning equipment will be built by Carrier and installed by Dravo Corporation.

Wilbert J. Austin

CLEVELAND—Wilbert J. Austin, president of The Austin Company, was among the victims in the airliner which crashed at Chicago December 4. Mr. Austin was graduated from Case School of Applied Science in 1899. In 1900, after a year's travel and study abroad, he joined his father who had already developed a substantial following as a builder of residential, commercial and industrial structures. He brought an engineering approach which ultimately led to the development of the idea under which Austin has planned and built plants for the country's leading industries over a period of 40 years under contracts embracing all phases of design and construction.

Mr. Austin, 64, was a trustee of Case, past president of its alumni, chairman of its building committee, and a member of the Y.M.C.A. national council. He was a member of the New York Bankers' Club, Detroit Yacht Club, Highland (Florida) Club, Cleveland Engineering Society, and the Union Club and Shaker Heights Country Club of Cleveland.

He is survived by his widow, the former Ida Stewart, two sons, Allan S. of Cleveland and Donald G. Austin of Houston, Texas, a daughter, Mrs. Charles G. Rodgers of Cleveland and four grandchildren.

ABSTRACTS of Current Papers, Books and Pamphlets

Pumps

An engineer with one of the pump manufacturing companies and one of the associate editors of *Power* have collaborated in preparing a monograph on pumps. Their aim has been to produce a work that would be useful to everyone that would be interested in pumping problems and not to confine the book to problems of design. Space has been given to a description of the types of pumps available and in a general way to the applications for which they are suited. The performance of pumps has been adequately treated as has the subject of pump operation in relation to load conditions. Extensive treatment has also been given to pump installation, supervision and troubles.

Chapters include those on reciprocating, centrifugal, turbine, propeller, rotary, deep-well, boiler-feed, sewage and variable displacement pumps as well as sections on priming, head, sizing, operation, drives and troubles.

[*"Pumps," by Frank A. Kristal and F. A. Annett. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., N. Y. Cloth bound; 9¼ x 6¼ in.; 339 pages. Price, $3.50.*]

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Boiler Operation

Designated as a modern handbook specializing on boilers and boiler equipment, "Boiler Operator's Guide," by Harry M. Spring, Jr., is probably the best book so far to appear on this subject. Within its 350 pages it covers design and construction of different types of high pressure boilers, boiler appliances and auxiliaries, boiler plant management, and plant operation.

The author, who is a boiler inspector of considerable experience, has made the text sufficiently non-technical to benefit the younger engineers and yet contain information of interest and value to experienced operators. A feature of the book is the questions and answers at the end of most of the chapters and which are typical of those asked in State examinations for firemen's, engineers' and boiler inspectors' licenses. In addition the book includes five appendices covering the glossary of boiler terms, materials, boiler scale, instructions for riveted patches and boiler safety rules.

[*"Boiler Operator's Guide," by Harry M. Spring, Jr. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., N. Y. Cloth bound; 6¼ x 9¼ in.; 353 pages. Price, $3.00.*]

BRIEF REVIEWS

Chemistry and Physics. The 24th edition of the Handbook of Chemistry and Physics reaches an all time high in number of pages—2581. A feature of this new edition is the table of physical constants of industrial organic compounds. The table on properties of commercial plastics has also been revised. The book is divided into five parts covering mathematical tables; properties and physical constants; general chemical tables; heat, sound, electricity and light; and quantities and units and conversion tables. [*"Handbook of Chemistry and Physics." Published by The Chemical Rubber Co., Cleveland, Ohio. Bound in fabricoid; page size, 4¾ x 7⅞ in., 2581 pages. Price, $3.50.*]

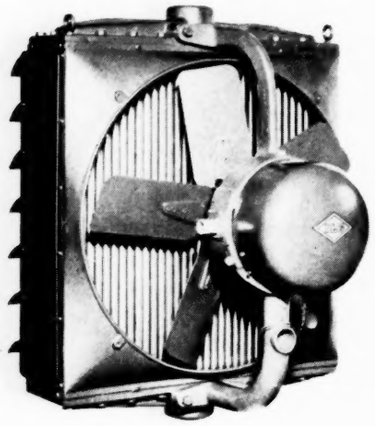
District Heating. The official Proceedings of the 31st Annual Meeting of the National District Heating Association, including the reports of the operating statistics, sales development, distribution, rates and regulations, meters and accessories, steam engineering, research and other committees. [*"1940 Proceedings of the National District Heating Association." Published by the National District Heating Association, 1231 Grant Building, Pittsburgh, Pa. Bound in red cloth; size, 6¼ x 9 in., 272 pages.*]

Air Conditioning. Papers presented at the first annual air conditioning short course, sponsored by the Department of Mechanical Engineering of the Agricultural and Mechanical College of Texas. Papers include the following: Air Conditioning for Human Comfort; Research as Related to Air Conditioning; Chemical Humidity Control; Air Conditioning Equipment—Its Functions and Some Factors Influencing Its Selection; Air Flow and Distribution; Air Conditioning Controls; Heat Loss and Gain Calculations, and Trouble Shooting Service Problems. [*"Papers Presented at the First Annual Air Conditioning Short Course," sponsored by the Department of Mechanical Engineering of the Agricultural and Mechanical College of Texas, August 17-19, 1939. Bulletin No. 49. Paper cover; 6 x 9 in.; 71 pages. Available on request to School of Engineering, Texas Engineering Experiment Station, College Station, Texas.*]

Sales Engineering. It is surprising that in view of the large number of engineers who find their way into sales work how very few books have ever been written on this all-important branch of engineering. The author of this book, an authority on marketing, has prepared the book to place before the younger sales engineers, in simple terms, the principles of sales engineering. [*"Sales Engineering," by Bernard Lester. Published by John Wiley & Sons, Inc., New York. Bound in cloth; 5¾ x 8¾ in., 200 pages. Price, $2.*]

Controls. Three standard size engineering monographs on boiler room instrumentation and automatic combustion control. The first is entitled, "How Close Can Steam Pressure be Controlled?" The second deals with "Why Operate Automatic Combustion Control from Changes in Steam Pressure?" and the third, "Adapting Automatic Combustion Control to the Characteristics of Underfeed Stokers." [*"Engineering Monographs." Published by the Hays Corporation, Michigan City, Indiana. Printed on standard size sheets. No. 1, three pages; No. 2, two pages, and No. 3, five pages. Available on request from the Hays Corporation.*]

NEW EQUIPMENT



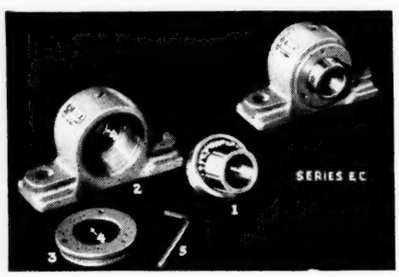
Non-clogging unit heater.

Ilg Textile Type Unit Heater

NAME—Ilg Textile Type unit heater.
PURPOSE—For warming textile plants and other places where lint and other substances adhere to fin surfaces.
FEATURES—Unit is equipped with a self cooling motor and the coils are designed so that dirt and lint will not clog them. Three sizes are available.
MADE BY—*Ilg Electric Ventilating Company, 2850 N. Crawford Avenue, Chicago, Ill.*

Ahlberg Pillow Block

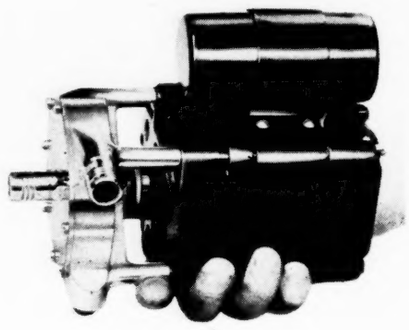
NAME—Ahlberg pillow block series EC.
PURPOSE—A self-aligning ball bearing pillow block.
FEATURES—Pillow blocks are designed for light and normal service where reliable yet inexpensive bearings are required. They are now equipped with Neoprene (synthetic rubber) seals to protect the bearings and lubricant. These seal rings turn with the shaft and float in the housing. They are said to be of the effective labyrinth type, frictionless and long wearing. Complete units consist of self-aligning precision ball bearings in one-piece accurately machined housings. In picture reference, (1) Self-aligning ball bearing, (2) sturdy one-piece housing, (3) removable end cap, (4) labyrinth seals and (5) wrench.
MADE BY—*Ahlberg Bearing Company, 4786 South Whipple Street, Chicago, Ill.*



Ahlberg pillow block.

Eastern Centrifugal Pump

NAME—Eastern Midget Model D centrifugal pump.
PURPOSE—For pumping thin liquids especially in those applications where space, weight and portability are factors.
FEATURES—Main features are said to be compact size and construction, performance characteristics in relation to size, capacity for continuous duty operation and suitability for use in presence of fire and explosion hazards. Unit is 7¾ in. long, 6⅜ in. high, 5⅛ in. wide and weighs 14 lb. Motor is designed to operate on 110 volts, 60-cycle, single phase. The unit is said to deliver 5 g.p.m. at 17 lb. per sq. in. at maximum.
MADE BY—*Eastern Engineering Company, 45 Fox Street, New Haven, Conn.*



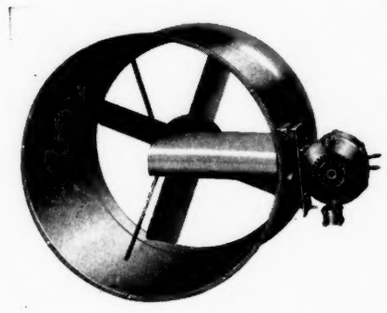
Eastern Midget centrifugal pump.

Reznor Unit Heaters

NAME—Reznor gas-fired unit heaters.
PURPOSE—For supplying warm air using gas as a fuel.
FEATURES—This new line of unit heaters includes fan, blower and duct type units. Among the features of these units are 16 gauge furnace steel and finned cast-iron combustion chamber, heat exchanger and flue chamber built of plymetal which is a copper bearing molybdenum steel sheathed on both sides with a layer or ply of rustless alloy, cast-iron burners and aluminum fan blades. Each unit is available in five capacities ranging from 55,000 to 200,000 B.t.u. per hr. input.
MADE BY—*Reznor Manufacturing Co., 227 James St., Mercer, Pa.*

DeBothezat Paint Spray Booth Fan

NAME—DeBothezat booth fan.
PURPOSE—For exhausting air.
FEATURES—Fan is said to assure the required protection against hazards of paint spraying under all operating conditions. It is said to be corrosion resisting and non-sparking. The motor is mounted outside the fan housing on an adjustable base, and power is transmitted by V belts through a vapor proof chamber. Fan wheels are of die-formed aluminum and blades are easily removable for cleaning.
SIZES—18 to 42 in.
MADE BY—*DeBothezat Ventilating Equipment Division, American Machine and Metals, Inc., East Moline, Ill.*



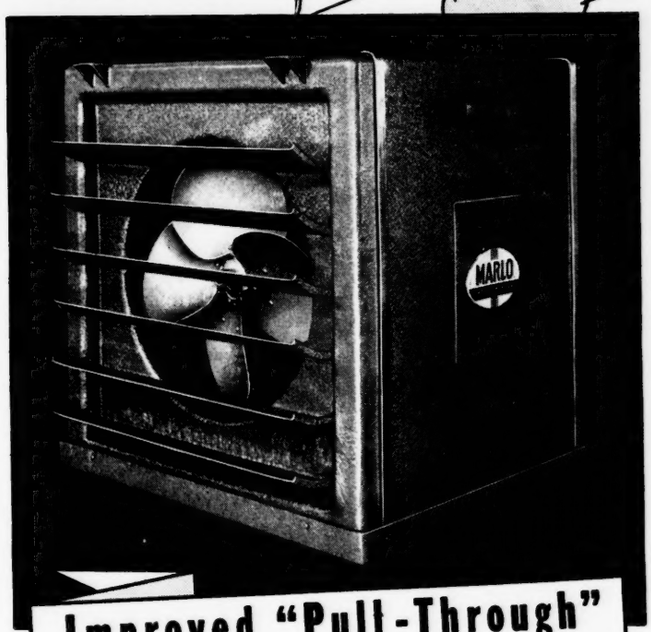
Paint spray booth fan.

Colloid Moisture Detectors

NAME—Delmhorst Moisture detectors.
PURPOSE—For measuring the moisture content of many materials such as chemicals, insulation, paper or wood.
FEATURES—Instrument is said to detect all moisture present whether it is on the surface or sub-surface. In operation the needle electrode is pressed into the material and then the button is pressed or a knob turned to indicate the degree of moisture present. Three models are available. (1) Model C-2 for testing moisture in plaster, brick or concrete; (2) Model 2-CM for testing wood-frame structures, plaster or tracing leaks; (3) Model 5-M for lumber and wood products.
MADE BY—*Colloid Equipment Co., Inc., 50 Church St., New York, N. Y.*

For determining moisture content of materials.

WE KILLED ALL DEAD SPOTS



Improved "Pull-Through" Design . .

The Outstanding Feature of the New Model 1941

MARLO
UNIT COOLER

The full coil surface is evenly effective. No more dead spots—"Pull-Through" does it!

All aluminum construction—Cast End-Frames.

Full range of sizes.

Venturi Fan Ring—Quiet Operation.

Suitable for comfort cooling applications.

See it at the Show, in January.

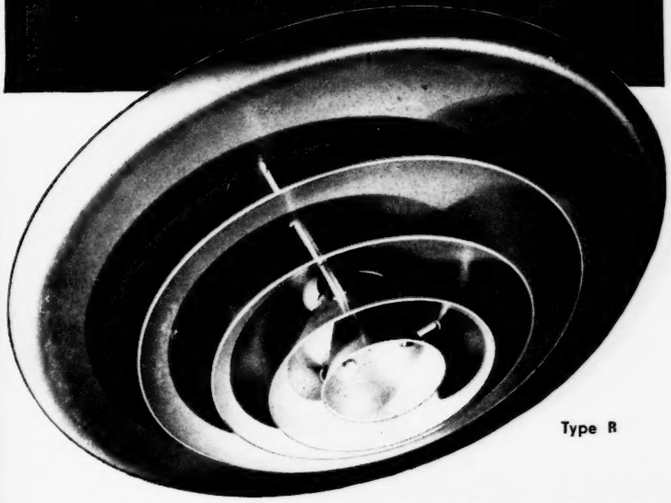
MARLO COIL COMPANY

6135 Manchester Avenue, St. Louis, Missouri

Refrigerating Equipment Manufacturers

ANEMOSTAT

HIGH VELOCITY, *Draftless* AIR DIFFUSERS



Type R

. . . WILL SOLVE YOUR AIR DISTRIBUTION PROBLEMS!

Securing satisfactory air distribution in large spaces, is one of the problems facing air conditioning and ventilating Engineers and Contractors in many of the industrial plants and extensions now going up. ANEMOSTATS readily solve this problem because they operate effectively in a wide range of velocities over a large floor area.

Furthermore, ANEMOSTATS often permit the use of **higher air velocities** and **greater temperature differentials,** with corresponding reduction in size of plant, duct work and number of outlets — all adding up to substantial savings in initial and operating costs.

For this reason, and because their patented and exclusive **design positively assures draftless air distribution and equalization of temperature, and hence humidity, throughout the areas they serve,** ANEMOSTATS are an essential part of every air conditioning and forced ventilating system.

ANEMOSTATS are also readily applied to existing systems. Thus, they open the door to more new business for contractors in the many factories in which air distribution is unsatisfactory.

GET FULL ANEMOSTAT DETAILS

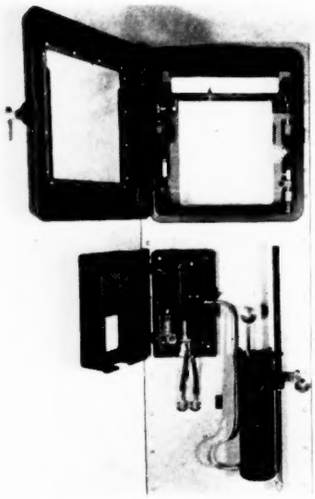
Send today for descriptive literature. And remember, we offer full cooperation to the Engineer for working out the application of ANEMOSTATS to specific air distribution requirements. Write us.

ANEMOSTAT
CORPORATION OF AMERICA

Dep't G, 10 East 39th Street,
New York, N. Y.

Representatives in Principal Cities

"NO AIR CONDITIONING SYSTEM IS BETTER THAN ITS AIR DISTRIBUTION"



For indicating dissolved oxygen in water.

Cambridge Boiler Corrosion Control

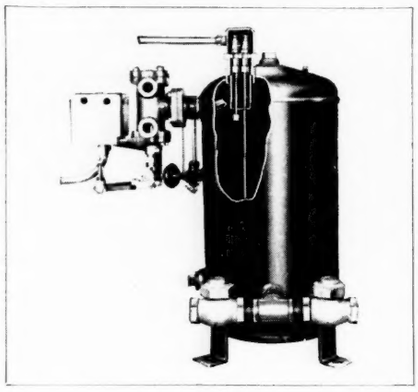
NAME—Dissolved oxygen recorder.
PURPOSE—For indicating amount of dissolved oxygen in feed water to boilers.
FEATURES—According to the manufacturers the dissolved oxygen in feed water is an important source of corrosion. This instrument is said to be completely automatic and provides a continuous indication and record of dissolved oxygen entering the boiler. The sensitivity of the instrument is claimed to be such that dissolved oxygen in feed water can be measured to one part in 400 million. It records full scale upon a chart 10 in. wide and has a range of 0 to 1 part of dissolved oxygen per million parts of water.
MADE BY — *Cambridge Instrument Company, Inc., Grand Central Terminal, New York, N. Y.*

Schaub Boiler Water Feeder

NAME — Magnetrol low water cut-off and automatic water feed, model P-25.
PURPOSE—A package set which provides the necessary equipment for complete automatic control of boiler water level on low pressure heating boilers, including automatic feed and low water cut-off.

For controlling boiling water levels.

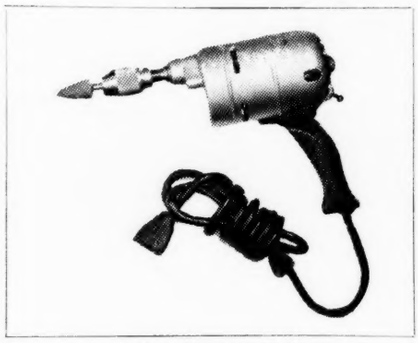
FEATURES — Set includes an automatic electric boiler water feeder, strainer, and No. 25 Magnetrol low water cut-off. The electric water feeder installs into ½ in. water supply line to the boiler. When a low water condition occurs in the boiler the Magnetrol shuts the firing equipment off and starts the water feeder simultaneously. When the water rises to the proper operating level the Magnetrol automatically stops the feeder and re-starts the stoker or oil burning equipment.
LITERATURE AVAILABLE—Bulletin No. 510.
MADE BY—*Fred H. Schaub Engineering Co., 325 West Huron St., Chicago, Ill.*



Control valve gear may be installed on Electrap or in any convenient location.

Johnson Boiler Electrap

NAME—Johnson Electrap.
PURPOSE—For returning condensate to boilers, lifting or pumping water or other liquids, or draining systems under vacuum.
FEATURES — This is a re-designed model of a Johnson Electrap in which all of the controlling valve gear has been gathered into one compact assembly. If the trap receiver must be installed in some inaccessible spot, this solenoid operated steam-vented valve can be brought out to any convenient location. The receiver is then completely without stuffing boxes or moving parts of any kind. The motionless electrode control is the same as has been used for several years. Rising water level in the trap receiver closes an electrical circuit between the two electrodes which by means of a relay opens the solenoid valve allowing pressure into the trap receiver. When water level falls below longest electrode, the electrical circuit is broken and the solenoid valve returns to vent position.
SIZES—Available in sizes suitable for boilers from 20 to 200 hp. with pressures up to 150 lb. and discharges as much as 21,000 lb. of water per hr.
MADE BY — *Johnson Corporation, Three Rivers, Mich.*



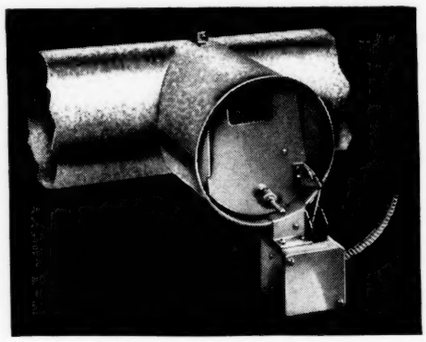
Whiz Electric Tool.

Paramount Electric Tool

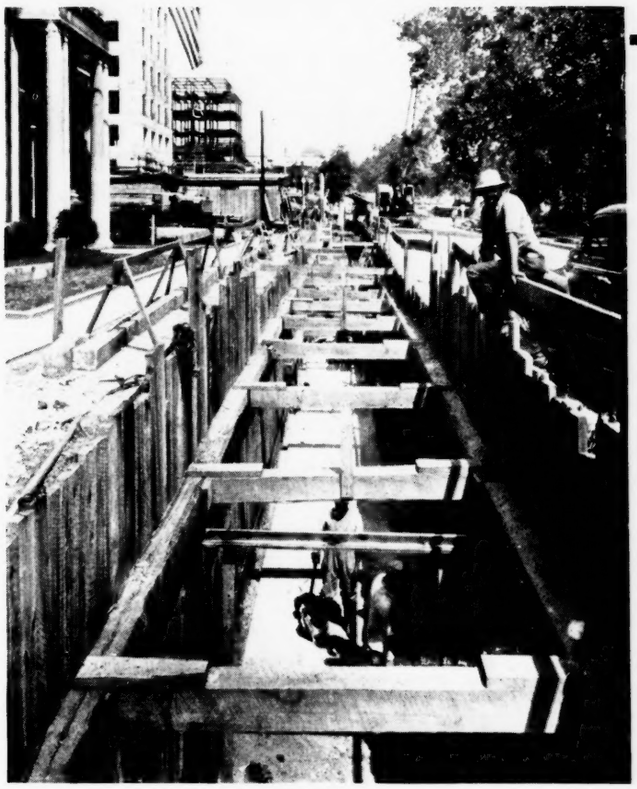
NAME—Whiz Electric Tool.
PURPOSE — A small power tool for performing such operations as drilling, grinding and sanding.
FEATURES — This small power-hand tool is said to be suitable for drilling holes up to ¼ in., grinding with wheels 4 in. in diameter, and for performing such operations as sharpening, sanding, polishing, sawing, etching or engraving. It is equipped with a 110 volt A.C. - D.C. motor which has a thrust ball bearing. A cooling fan in the motor is said to prevent the motor from overheating even when used continuously. A three-jaw coil spring chuck is employed. Tool weighs approximately 3½ lb. and is 7⅝ x 6 in. in size. Two models are available, a standard model which is said to utilize no less than 50 different accessories, and a two-speed model which is said to use 200 different accessories.
MADE BY — *Paramount Products Co., 48 West 48th St., New York, N. Y.*

Conco Motorized Draft Control

NAME—Field motorized draft control.
PURPOSE—To retard the draft during the off-period of automatic firing equipment and regulate the draft during the on-period.
FEATURES—The device consists of a regular type M Field barometric draft control equipped with an approved torque motor wired direct to the burner control box.
SIZES—9, 10, 12, 15, 18 and 20 in.
MADE BY—*Conco Engineering Works, Mendota, Ill.*



Motorized draft control.



UNDERGROUND
STEAM LINES
IN TUNNELS OR CONDUITS

We specialize in installing Steam Distribution Lines either in tunnels or conduits. Let us apply our extensive experience in figuring the best installation for your requirements.

The work illustrated is the completed excavation prior to the building of a concrete tunnel with inside dimensions 7 x 6½ ft. in which Steam Mains are to be installed. When you are contemplating similar jobs or conduit types of construction, let us make you a proposal to make the complete installation. You can profit by our experience.

WELDED PIPE LINES AND UNDERGROUND STEAM MAINS A SPECIALTY

S. E. DOCKSTADER, Piping Contractor

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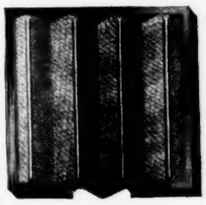
Instantaneous Direct Reading All Purpose

AIR VELOCITY METER

The Alnor Velometer is a sensitive, accurate, durably built and easily used portable instrument. Indispensable to engineer and technician for measuring air velocities for all types of grilles, ceiling outlets and ducts. Write for bulletin giving detailed information.

ILLINOIS TESTING LABORATORIES, INC.
143 W. Hubbard St. CHICAGO, ILL.
Manufacturers of electric thermometers and pyrometers



Make the first cost the last cost!

Where Somers Hair Spun Glass Filters are installed as original or replacement equipment there's an end to the cost. Somers Filters are washable, odorless, non-absorptive, do not rot, and are practically indestructible.

Dust, dirt, pollen and detritus in the air stream effectively removed with minimum back pressure. No adhesives required.

Somers Filters may be cleaned easily by using the stream from an ordinary water hose (at city pressures) pinched to obtain a spray effect.

SOMERS HAIR GLASS FILTER

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Number of Degree-Days for November, 1940

HEATING & VENTILATING continues its thirteenth year of publishing degree-day data for various large cities. Forty-four cities have been added to those previously published, making a total of 114 cities listed below.

	Degree-Days November, 1940	Cumulative
Albany, N. Y.	807	1573
Alpena, Mich.	928	1649
Atlanta, Ga.	401	504
Atlantic City, N. J.	526	938
Baker, Ore.	993	1654
Baltimore, Md.	498	843
Binghamton, N. Y.	779	1514
Birmingham, Ala.	355	424
Bismarck, N. D.	1272	1834
Boise, Idaho	885	1367
Boston, Mass.	664	1225
Buffalo, N. Y.	774	1413
Burlington, Vt.	885	1735
Cairo, Ill.	535	666
Canton, N. Y.	927	1799
Charles City, Iowa	1017	1469
Charlotte, N. C.	389	549
Chattanooga, Tenn.	510	726
Cheyenne, Wyo.	982	1611
Chicago, Ill.	792	1143
Cincinnati, Ohio	637	925
Cleveland, Ohio	695	1162
Columbia, Mo.	707	895
Columbus, Ohio	694	1065
Concord, N. H.	797	1557
Concordia, Kan.	828	985
Davenport, Iowa	836	1099
Dayton, Ohio	695	1059
Denver, Colo.	813	1168
Des Moines, Iowa	882	1138
Detroit, Mich.	805	1343
Dodge City, Kan.	725	884
Dubuque, Iowa	907	1292
Duluth, Minn.	1175	1867
Eastport, Me.	832	1775
Elkins, W. Va.	707	1290
El Paso, Tex.	422	480
Erie, Pa.	710	1257
Escanaba, Mich.	968	1698
Evansville, Ind.	632	884
Fort Smith, Ark.	461	530
Fort Wayne, Ind.	800	1223
Fort Worth, Tex.	357	383
Grand Rapids, Mich.	817	1334
Green Bay, Wis.	955	1530
Greensboro, N. C.	499	777
Harrisburg, Pa.	639	1160
Hartford, Conn.	712	1386
Helena, Mont.	1259	1896
Huron, S. D.	1114	1500
Indianapolis, Ind.	701	966
Ithaca, N. Y.	783	1523
Kansas City, Mo.	722	866
Keokuk, Iowa	771	985
Knoxville, Tenn.	493	680
LaCrosse, Wis.	990	1459
Lander, Wyo.	1220	1812
Lansing, Mich.	868	1507
Lincoln, Neb.	888	1064
Little Rock, Ark.	422	489
Los Angeles, Calif.	91	123
Louisville, Ky.	555	756
Lynchburg, Va.	472	775
Madison, Wis.	941	1414
Marquette, Mich.	971	1681
Memphis, Tenn.	409	485
Milwaukee, Wis.	862	1303
Minneapolis, Minn.	1115	1578
Nantucket, Mass.	601	1136
Nashville, Tenn.	502	643
New Haven, Conn.	658	1207
New Orleans, La.	159	163
New York, N. Y.	602	1037
Norfolk, Va.	368	576
Northfield, Vt.	908	1893
North Platte, Neb.	906	1210
Oklahoma City, Okla.	581	646
Omaha, Neb.	906	1123
Oswego, N. Y.	769	1460
Parkersburg, W. Va.	625	1014
Peoria, Ill.	804	1103
Philadelphia, Pa.	558	946
Pittsburgh, Pa.	645	1075
Pocatello, Idaho	980	1589
Portland, Ore.	621	878
Providence, R. I.	659	1219
Pueblo, Colo.	870	1189
Raleigh, N. C.	385	601
Reading, Pa.	630	1146
Reno, Nev.	748	1225
Richmond, Va.	467	766
Rochester, N. Y.*	781	1468
Roseburg, Ore.	540	806
St. Joseph, Mo.	774	928
St. Louis, Mo.	628	752
Salt Lake City, Utah	821	1121
Sandusky, Ohio	749	1189
San Francisco, Calif.	239	391
Sault Ste. Marie, Mich.	1034	1868
Scranton, Pa.	734	1419
Seattle, Wash.	609	915
Sioux City, Iowa	...	....
Spokane, Wash.	983	1440
Springfield, Ill.	717	912
Springfield, Mo.	...	....
Syracuse, N. Y.	774	1506
Tacoma, Wash.	654	1035
Terre Haute, Ind.	688	921
Toledo, Ohio	789	1256
Trenton, N. J.	618	1112
Utica, N. Y.	823	1590
Washington, D. C.	510	871
Wichita, Kan.	728	847
Yakima, Wash.	902	1247

*The degree-days for October for Rochester, as published in the December issue, were incorrectly given as 118. The correct figure is 551.

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. . . You take no chances with Patterson Hot Storage Heaters for we'll furnish an iron-clad guarantee that they will supply all the hot water required, as hot as required, as quickly as required. Furthermore, we guarantee these heaters not to rust or cause red water.

We can make such a guarantee because 61 years' experience enables us to work out all problems with exactness.

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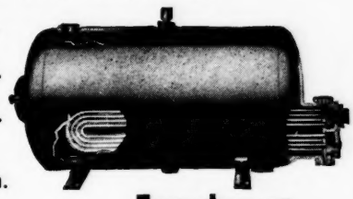

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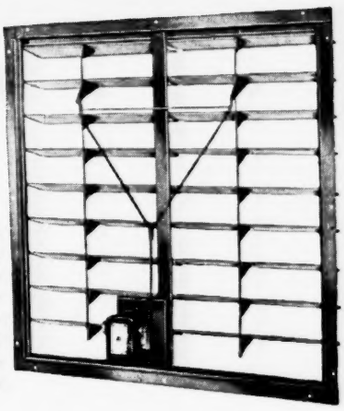
All-Steel Motorized Shutter



Used for exhaust ventilation in industrial, commercial and residential buildings. Automatically controlled by fan switch. Six-second opening. Positive closing. Storm-proof. All-steel construction.

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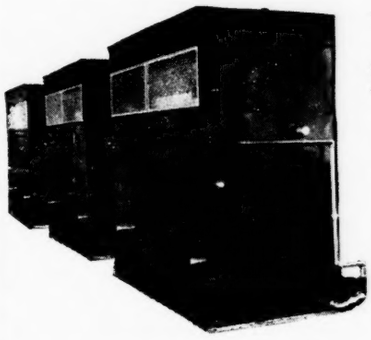

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Nozzles of unique Yarway Involute Design.

No internal parts or vanes to clog or erode.

Insure trouble-free air washing service.

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What air conditioning is, what it can do, its technical fundamentals, methods of applying them and the types of equipment available.

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Condensate Pumps. Standard size, 12-page bulletin No. 340-D, which describes the complete line of Sterling Condensate Pumps. Includes listings and selection tables for Sterling No. 3800 series; 3700 series underground condensate pumps; 3900 single and duplex; 4000 series "Lowboy," and the self-contained 3500 series. Bulletin includes a complete capacity and dimension table for the 3500 series listing capacities from 2000 to 65,000 sq. ft. EDR. Back page is devoted to a review of Sterling equipment for all types of steam, vapor, vacuum and hot water systems. STERLING, INC., 3732 North Holton Street, Milwaukee, Wis.

Flow Meters. A four-page, two color folder, No. 140, on the Adsco flow meter of the orifice type for the accurate metering of steam, water, air or gas has just been issued. It illustrates and describes the construction of the meter which can be supplied with recording chart, indicating scale and integrating counter to totalize the flow or in other combinations of these three devices. AMERICAN DISTRICT STEAM COMPANY, North Tonowanda, N. Y.

Pipe Fitting. A 240-page, standard size, cloth bound catalog, No. 63, on Kennedy valves, pipe fittings and fire hydrants. Includes information on valves for low, standard and high pressure; standard bronze and malleable iron screwed fittings; standard cast iron flanged fittings and flanges; fire hydrants and various valve specifications. Also includes recommendations for the selection of valves and fittings, suggestions for operation, care and maintenance of valves and other useful engineering data. Available when requested on company letterhead. THE KENNEDY VALVE MFG. CO., Elmira, New York.

Steel Pipe Fittings. A 216-page catalog No. 401 on the Taylor Forge & Pipe Works line of stainless steel fittings for welding and forged steel flanges. Book includes much technical data not readily available elsewhere. Data is presented on design, pressure and temperature ratings, flange bolting, new test analysis, and accepted standards. Prices and dimensions are shown for every fitting in the Taylor line. TAYLOR FORGE & PIPE WORKS, P.O. Box 485, Chicago, Ill.

V-Belts. A 170-page, 4 by 6 in. V-belt data book giving alphabetical listings of belt requirements for refrigerators, water pumps, stokers, oil burners, air compressors, and similar equipment. Listing gives the manufacturers' part number, Goodrich belt number, and its size in each case. Twenty-four pages are devoted to numerical group listings of belt sizes and eight pages to a numerical list of belt dimensions for both V and flat belts. THE B. F. GOODRICH COMPANY, Akron, Ohio.

WITH THE MANUFACTURERS

Air Devices Inc., 17 E. 42nd St., New York, manufacturers of Agitair air diffuser outlets, has been appointed sales representative in New York City for *Albert G. Purdue Associates* of New Haven, for that company's line of electric oil heating systems. In line with the expanding activities of Air Devices the company announces that *Milton W. Way*, formerly Boston manager for Preferred Utilities, has joined its staff.

A. M. Byers Co., Pittsburgh, will enlarge its activities

MARSH Valves and Traps meet the CURRENT CALL

THE need for heating specialties of finest quality for barracks, cantonments and hangars is being met by hundreds of Marsh products like those illustrated here. All are acceptable to all branches of government under all specifications.

Marsh facilities mean IMMEDIATE SHIPMENT

Increased manufacturing facilities makes it possible to fill orders promptly—fill them with valves, traps and vents which offer that ideal combination of high quality at moderate price demanded by the preparedness program.

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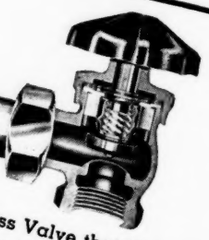
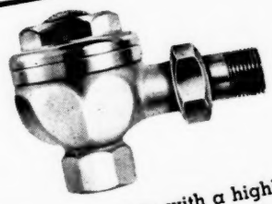
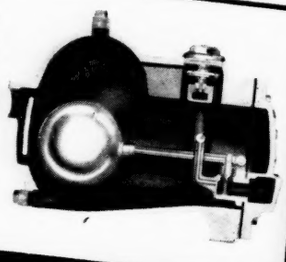


● A packless Valve that IS packless. The exclusive Marsh metal-to-metal seal makes it permanently leak proof. Available in all patterns and finishes.



● A radiator trap with a highly sensitive thermostatic element that assures efficient operation. Available in both diaphragm and bellows types — all patterns.

● The Marsh No. 14 Heavy Duty Float and Thermostatic Trap for draining coils, headers, etc. The Marsh trap line includes a complete line of float and thermostatic traps as well as inverted bucket traps and other types.



to include the production of a broad line of alloy steels, including stainless. Production will begin within four to six months. An addition will be built to the company's Ambridge plant, and will be used as a melt shop for new electric furnace equipment that is to be installed. Other basic production equipment for heating and rolling alloys already is in existence within the plant.

Baker Ice Machine Co., Omaha, Neb., has appointed *Edward H. Reuss, Jr., Inc.,* Philadelphia, as distributor in Philadelphia and surrounding territory.

Carrier Corporation, Syracuse, has sold its Allentown, Pa., plant to American Armament Corporation.

Manning, Maxwell & Moore, Inc., Bridgeport, Conn., has appointed *Clinton D. St. Clair* as works manager of its Hancock Valve Division plant in Boston.

McQuay, Inc., Minneapolis, Minn., has appointed *Harry T. Hallstein* as application engineer for air conditioning equipment. Mr. Hallstein received his mechanical engineering degree from Purdue University in 1932 and climaxed his three years association with Delco Frigidaire Corporation as district air conditioning engineer in Springfield, Mass. He comes to McQuay after doing research in heat transfer for his Master's degree at Purdue.

McQuay, Inc., Minneapolis, Minn., has appointed *Robert N. Weber* to be in charge of a new department for special service to industrial customers. He was formerly with the air conditioning division of Fairbanks-Morse and Company, where he was engaged for four years.

Philco Corporation, Philadelphia, Pa., has appointed *Arthur C. Nodine* as national supervisor of Philco-York Air Conditioning. Mr. Nodine, who has been with Philco for the past 14 years, was formerly Philco sales manager for refrigerators and air conditioners in the North Eastern states.

Research Products Corp., Madison, Wis., has appointed three distributors for Research Air Filters. *P. J. O'Meara Company,* 50 Hawthorne Street, San Francisco, will cover northern California and part of Nevada; *Harrison Sales Company,* 314 Ninth Avenue North, Seattle, will cover Washington, Oregon, British Columbia, and northern Idaho. The new sales representative for Arizona, Clark County, Nevada, and southern California is *Trade-Wind Motorfans, Inc.,* 1325 Maple Avenue, Los Angeles.

Revere Copper and Brass Incorporated, New York, through C. Donald Dallas, president, has announced that in order to aid in defense his company is offering a series of cash awards for the best suggestions to aid in speeding up America's industrial defense program, submitted by foremen, sub-foremen, and men at the bench in all branches of American metal industry.

Roots-Connersville Blower Corporation, Connersville, has announced that its turbine pump business consisting of condensate units, water systems and turbine pumps for industrial applications, has been sold to the Sterling Pump Corp., Hamilton, Ohio, who will manufacture and sell these pumps in the future under the Serling name.

The Trane Company, La Crosse, Wisconsin, has appointed *George R. Atherton* for executive sales work with the 85 Trane offices throughout the country. The appointment of Mr. Atherton, who is widely acquainted throughout the heating and air conditioning industry, comes simultaneously with the company's announcement that its manufacturing, representation and service facilities are being expanded.

Universal Cooler Corporation has moved its factory

MODEL R-30

MODEL R-40

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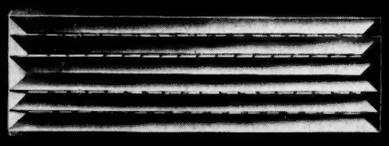

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FOR EVERY

MODEL CSF

MODEL CSB

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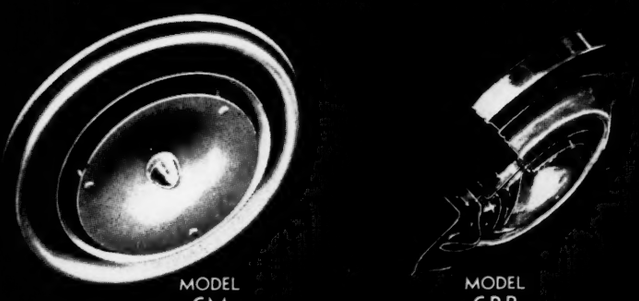

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THE ONLY COMPLETE LINE OF AIR DIFFUSERS FOR BOTH CEILING AND SIDEWALL DISTRIBUTION

ROUND, SQUARE, RECTANGULAR, PROPORTIONING

A SHAPE—SIZE—TYPE and MODEL for EVERY INTERIOR. DRAFTLESS TEMPERATURE EQUALIZATION can now be INSURED.

ASK FOR OUR GUARANTEE and investigate the advantages of "DIFFUSION PATTERN CONTROL" exclusively AGITAIR. Attractive Fluorescent Lighting Combinations—FLUSH—SURFACE—SUSPENDED

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Specialists in Air Distribution and Contro

REPRESENTATIVES IN PRINCIPAL CITIES

and offices from Detroit to Marion, Ohio, where it is now occupying the extensively remodelled former plant of the Susquehanna Silk Mills of that city.

Ward Leonard Electric Co., Mt. Vernon, N. Y., has opened a branch office in Rochester, N. Y. The new office, in the Lincoln Alliance Bank Building, 183 Main Street East, will be managed by *J. K. Savage*, sales engineer.

Warren Webster & Co., Camden, announces that *Ernest A. Flinn*, for the past 17 years a member of the New York office staff of Warren Webster & Company, has resigned to accept a position as New York representative of the Gustin-Bacon Mfg. Co. of Kansas City, manufacturers of railway and marine equipment. Webster customers whose requirements were formerly cared for by Mr. Flinn are being served by *J. F. Hanbury*, manager, *R. E. Lawton* and *K. C. Steeneck* of the New York office staff.

York Ice Machinery Corp., York, Pa., announces that a unique plan to coordinate the facilities of 248 manufacturing plants in York and vicinity for government defense work has been developed by *William S. Shipley*, chairman of the board, York Ice Machinery Corporation. York at present has upwards of $20,000,000 in defense orders, but under Mr. Shipley's plan this work has been split up among local industries without plant expansion or interference with regular commercial orders. The plan includes a pooling of all the manufacturing machinery in the county under the supervision of the York Manufacturers' Association. At association headquarters an information file of available machinery enables American or British government officials to determine in a few minutes if the city of York can handle a contract for them.

Young Radiator Co., Racine, Wis., has appointed *Roy E. Gorgen*, 205 Wesley Temple Bldg., Minneapolis, as sales representative in that territory for the company's Catalog Products Division. The company also announces the appointment of *George J. Haislmaier* as assistant sales manager of the Contract Products Division.

Young Radiator Company, Racine, Wis., has appointed *Tomlinson Steam Specialty Company*, 1599 St. Clair Avenue, Cleveland, as representatives in that territory for the company's catalog products division.

Young Regulator Co., 4500 Euclid Ave., Cleveland, has appointed *Roy M. Scott*, 323 Tenth St., San Francisco, as its representative for Northern California. *Air Filter Engineering Co.*, 2236 South Wabash Avenue, Chicago, has been appointed representative in the Chicago area.

COMING EVENTS

JANUARY 13-15, 1941. Convention of the National Air Conditioning Association at the Blackstone Hotel. Details obtainable from A. F. Callahan, executive secretary of the association. NACA Headquarters, 220 E. 42nd St., New York.

JANUARY 13-15, 1941. Annual meeting of the National Refrigeration Supply Jobbers' Association, Stevens Hotel, Chicago. Further information obtainable from R. M. McClure, Manager and Committee Secretary, Refrigeration and Air Conditioning Exhibition, 111 West Washington St., Chicago.

JANUARY 13-16, 1941. Third Refrigeration and Air Conditioning Exposition to be held at Stevens Hotel, Chicago.

JANUARY 27-29, 1941. 47th Annual Meeting of the American Society of Heating and Ventilating Engineers to be held at Hotel Muehlbach, Kansas City, Missouri, with Kansas City as Host Chapter.

MARCH 17-22, 1941. National Oil Burner Progress Exhibition of oil heating and air conditioning equipment. Commercial Museum, Philadelphia. Further information available through C. F. Curtin, Oil Burner Institute, 30 Rockefeller Plaza, New York.

JUNE 10-13, 1941. The 32nd Annual Meeting of the National District Heating Association. To be held at the William Penn Hotel, Pittsburgh, Pa.

JUNE 16-20, 1941. The Pacific Heating and Air Conditioning Exposition, Exposition Auditorium, San Francisco, Cal. Managed by the International Exposition Company, Grand Central Palace, New York.

JUNE 16-20, 1941. Meeting of the Heating, Piping and Air Conditioning National Association. To be held at St. Francis Hotel, San Francisco, Cal.

JUNE 16-20, 1941. Summer Meeting of the American Society of Heating and Ventilating Engineers. To be held at Palace Hotel, San Francisco, Cal.

JUNE 23-27, 1941. Annual meeting and exhibit of the American Society for Testing Materials. Palmer House, Chicago, Ill. For information, write Society at 260 So. Broad St., Philadelphia, Pa.

H&V'S PHOTOS

Page 25—York Safe and Lock Company.
Pages 28-29—Albert Kahn Associated Architects and Engineers, Inc.
Pages 30, 31, 33, 34, 35—Wright Aeronautical Corporation.
Pages 36-39—Pratt & Whitney, Div. of Niles-Bement-Pond.
Pages 40-41—U. S. Army Signal Corps.
Page 43—(Upper right) Acme Newspictures, Inc.
Page 44—(Upper left) Wide World Photos.
Page 46—Wide World Photos.
Pages 47-51—The Austin Company.
Page 52—Brown & Matthews.
Page 53—U. S. Navy.
Pages 61-62—Dravo Corporation.
Page 63—The Lincoln Electric Company.
Page 71—U. S. Army Signal Corps.

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It is packed under full steam pressure. By the turn of a wrench, integral pressure guns force a special semi-plastic packing into the stuffing box.

Welded Steel Construction. Alemite lubricated cylinder-guided sleeve. Made also in conventional gland-pakt types. Write for Bulletin EJ-1907.

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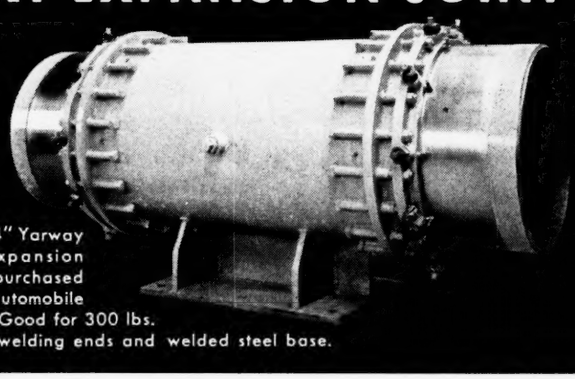

One of 40—24" Yarway Gun-Pakt Expansion Joints recently purchased by a leading automobile manufacturer. Good for 300 lbs. pressure, with welding ends and welded steel base.

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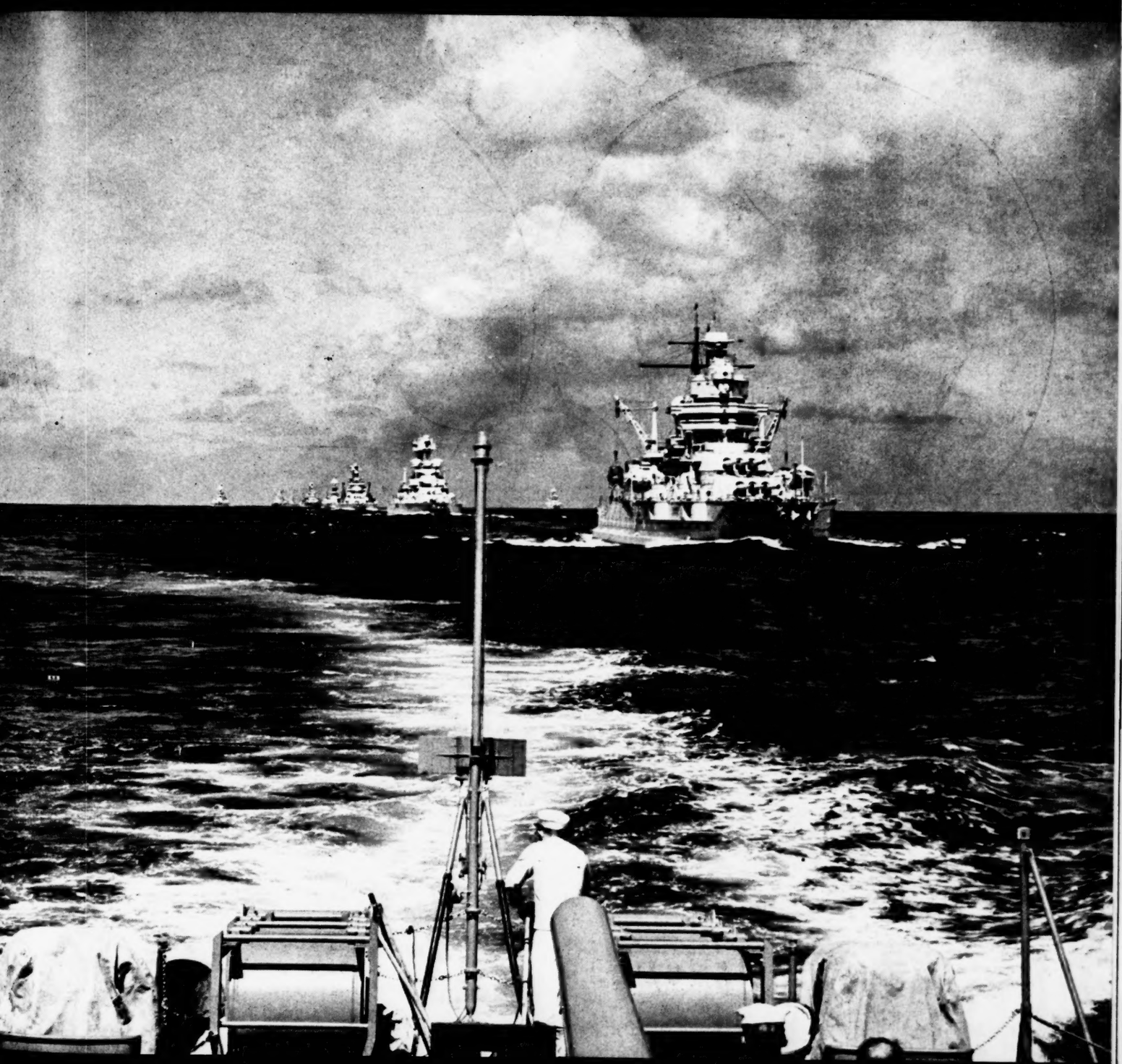
The Air Conditioning Monthly